Vol. XXV New York—Thursday, August 31, 1911—Chicago No. 9

THE AUTOMOBILE

# Records Fall at Elgin Stock Races

## National, Mercer and Abbott-Detroit the Winners

*Fast time featured the two days' racing over the Elgin, Ill., 8.5-mile course, where the 1911 National Stock Car championships were decided on Friday and Saturday, August 25 and 26. With the exception of the race for 161 to 230 cubic inch displacement cars the times showed a marked reduction over those of last year.*

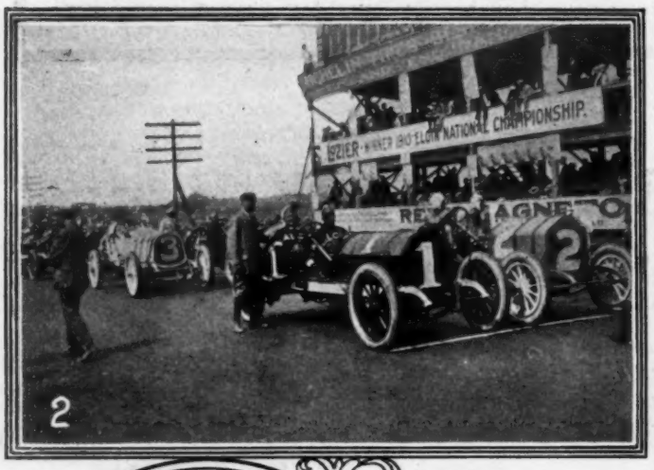
THE NATIONAL No. 2, DRIVEN BY LEN ZENGEL, CROSSING THE TAPE IN THE LEAD IN THE BIG RACE FOR THE ELGIN CUP

CHICAGO, Aug. 28—Four new champions were evolved from the running of the National Stock Chassis road races at Elgin, when National 2 (Zengel), National 1 (Herr), Mercer 15 (Hughes), and Abbott-Detroit, 33 (Roberts), received the magpie flag first in their classes. New marks were made in three of the four contests and the lap record of the course was sharply lowered by the Lozier entry (Mulford).

Shortly after the start of Saturday's contest, the Elgin National, ten sections of the grandstand collapsed, causing intense confusion and excitement for a short time and necessitating a new start. Fortunately no fatalities attended this mishap, although probably fifty persons were more or less hurt. The cars were sent on their way after fifty minutes of delay and within a few rounds several of the cars that had been prominent in prac-

tice were off the course for one reason or another and the race settled into a long grind to the finish. It was an easy victory for the National, with the Alco second, pushed out to the limit to beat the Mercer to the wire.

Over 40,000 witnessed the first day's events, which were run simultaneously, and on Saturday the crowd was estimated at 80,000. The manner in which the course was protected through-

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2—Line up of contestants in the Elgin Cup race, which took place on the last day

3—General view of the competing cars at the pits preparatory to Friday's races

4—Lozier, driven by Mulford, on the round in which it broke the lap record

5—The troops were taken to their stations on the course in motor trucks

6—Mercer won the Kane County Cup and finished third in the Elgin

out the races, and the attention to detail reflected great credit upon the Chicago Motor Club, which managed the racing end of the program.

In a nutshell this tells the story of a meet that rivaled in excitement any that ever has been run in this section. As to the racing end of it, there was little competition in the four events, and only in the Illinois was the finish at all close, and in that it was a case of two teammates fighting for the cup and being separated by but 9 seconds. The Kane County event seemed made to the order of Hughie Hughes, who never was threatened, while in the Aurora Kulick in the Ford, which finished second, never was much of a factor. In the big race the early elimination of most of the stars robbed that classic of its chief interest, although not until Zengel flashed across the tape for the last time was it certain the cup was his. Grant and Hughes were so close to him that a stop of any duration in the final stages might have changed the result. In this race the contest feature was the fight for second place between Grant in the Alco and Hughes in the Mercer and at the end a matter of but 11 seconds separated the two.

Ten of the twelve entrants in the Elgin National started and of these only three were caught by the judges, while there still was one running when the race was officially ended. Zengel, the winner, averaged 66.45 miles per hour as against the 62.5 miles per hour of Mulford, last year's winner. In the Illinois, Herr in the National, went the 202 miles at an average rate of speed of 65.6 miles per hour, and of the four that started only the two Nationals caught the eyes of the judges. The Kane County brought out the biggest field of the meet, eleven of the sixteen entries starting and seven of them finishing, with Hughes showing an average of about 63 miles an hour. The Aurora cup brought out all three of its entries and all three finished, with Roberts in the Abbott-Detroit averaging 53.5 miles per hour.

The accidents that tended to mar the meet, came the second day, although the first was not without its mishaps. On Friday, F. E. Radina, mechanician for Raimey, in the Cino, in the Kane County, suffered a broken ankle, while Robillard, driver of one of the Stavers, had a close call when he hit a telegraph pole, cutting it down. But it was the second day that was blackest and that there wasn't a long death roll as the result of the falling of a section of the grandstand, was a marvel. The day started most auspiciously—weather made to order, immense crowds and intense interest among the spectators who filled the stand to its capacity of 6,600. The ten candidates for the national honors had come to the tape, had been lined up and sent away on their 305-mile run when the accident occurred.

Grant was about due to show above the crest of Britten's hill, just west of the stand, and the spectators stood up to watch him come over the brink. Then came the crash. Possibly the swaying caused by so many people standing at once started the trouble. The west section started to fall, or rather drop, the next followed suit and like a house of cards the western quarter of the stand went to the ground. It wasn't a terrifying sight to watch, either, for the fall was so gradual that one hardly appreciated the gravity of the situation. The spectators for the

most part were so pinned in that they couldn't jump had they wanted to, and the big majority simply sat in their seats and waited for the inevitable. There wasn't must confusion about it, either, and the people in the east end of the stand hardly knew anything had happened.

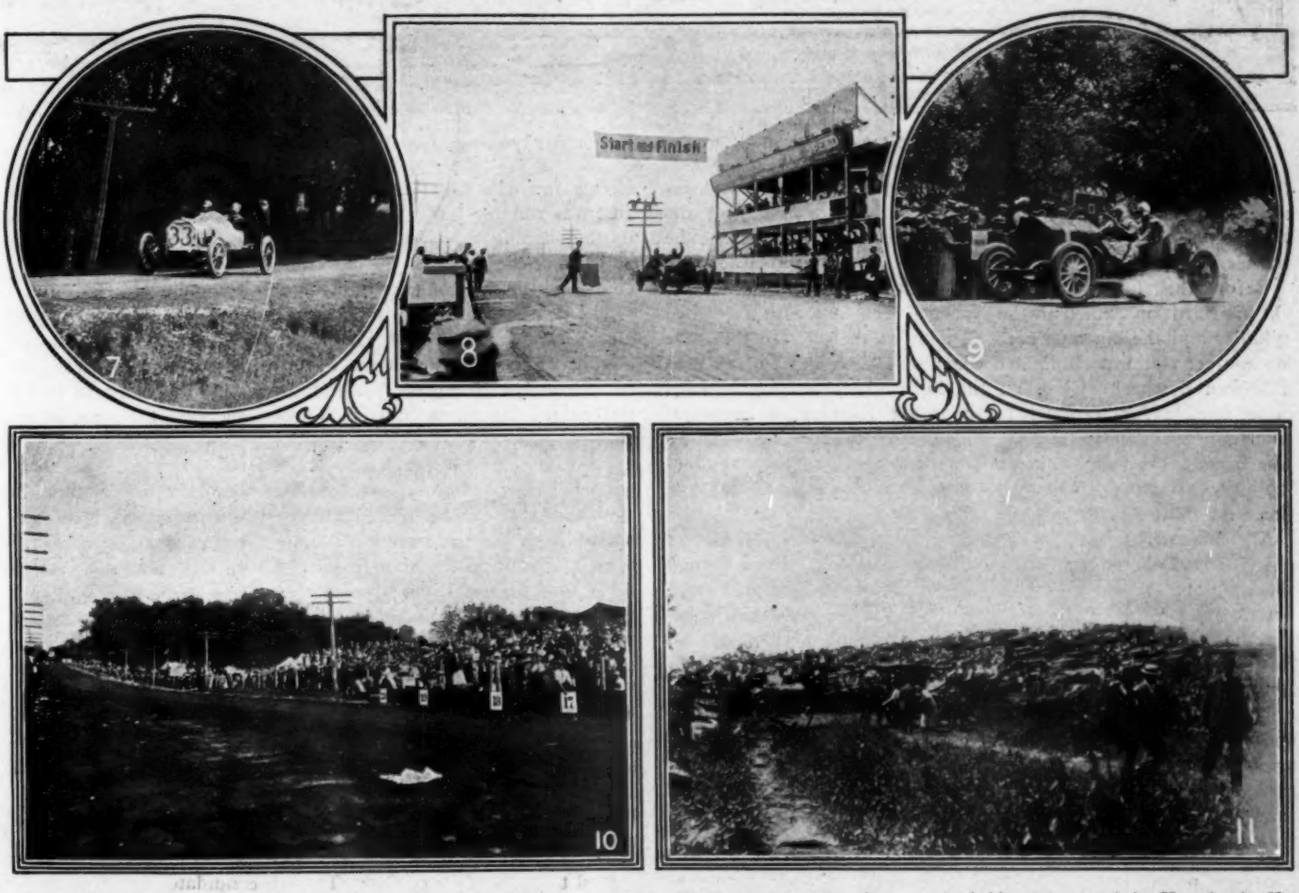
In all, probably 600 people fell with the stand and of these only forty were treated by the physicians who were on duty. The most serious injury was a broken leg sustained by one of the women spectators from Valparaiso, Ind., although three others had fractures that sent them to the hospital, one of the three being the daughter-in-law of Senator Lorimer. Probably fifty others were bruised or shocked, but none of them so badly that the physicians had to be called on.

No official statement has as yet been given out as to the cause of the fall of the stand, but it is presumed that it was a case of too much haste in erecting the seats. The stand was a part of the big stadium used for Chicago's recent aviation meet and was used at Elgin last year. The aviation meet extending one day longer than had been scheduled because of the benefit given last Monday, the contractor was delayed in getting it to Elgin. In fact, he still had his men working on it when darkness came Thursday night and it was not until Saturday morning that he had put the awnings over the boxes. The Chicago Motor Club had nothing at all to do with the erection of the stands or with the receipts therefrom, that coming under the jurisdiction of the Elgin Automobile Road Race Association.

The fact that the race had started added to the general confusion, but the officials at once became masters of the situation. Referee Beecroft and Chairman Butler of the A. A. A. Contest board, at once ordered the race stopped, and one by one the cars were flagged and lined up at the pits. It was ordered that they be held there until the officials could learn more about the accident. That this was a wise act was apparent to all, for if the race had continued there might have been more trouble, especially in trying to get the injured to the hospital. Only one lap had been run so no one's chances had been injured. For the most part the drivers backed up the officials and Mulford and Wishart even went so far as to offer to help take the injured to the hospital. However, this was not necessary, the ambulance service being sufficient for the needs of the occasion.

It was nearly an hour later before the second start was made, Grant in No. 1 Alco getting his signal at 11:50. Nine other followed him, the two absentees being the Cinos, one of which was put out in practice on Thursday when a broken connecting rod punched a hole in the crankcase. This caused Raimey to take Burt's place in the other Cino in the Kane County on Friday, but his accident in that race so damaged the car that it was impossible for it to line up with the others in the big event. This left Grant, Lee and Hartman in the Alcos, De Palma and Wishart in Simplexes, Aitken and Zengel in Nationals, Mulford in the Lozier, Buck in the Pope-Hartford and Hughes in the Mercer.

Right from the jump Mulford assumed the aggressive and from the way he burned up the course it looked as if he would repeat his last year's performance. He immediately opened a gap on the others traveling at a rate of 70 miles an hour. This he kept up for eight laps or 68 miles, when a burnt-out bearing put a piston and connecting rod out of commission and stopped the Lozier just at a time when its chances looked brightest. Mulford had one consolation, however, he pulled down the $200 cash prize given by the Stromberg Motor Devices Co. for the fastest lap. This came in the seventh round, which he negotiated in



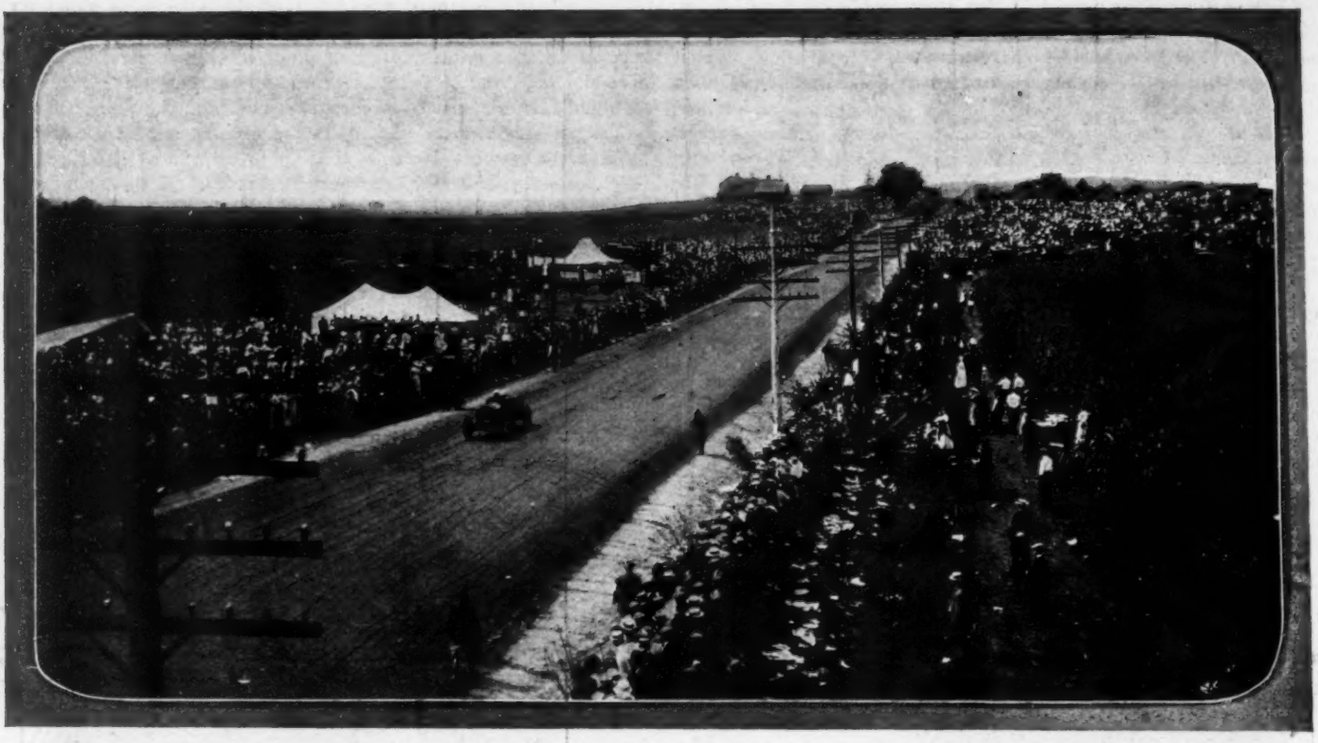

7—Abbott-Detroit, piloted by Roberts, which car won the Aurora Cup race

8—Mercer, No. 15, receiving the flag on the first day, winning the Kane County race

9—A bit of fast work by Herr in the National, which won the Illinois Cup

10—Giving an idea of the home stretch beyond the stand, and what a clear course means

11—Britton's Hill, a natural grandstand, which accommodated thousands on both days



Looking west from the top of the press stand—Britton's Hill on the right; showing Zengel's National at a 70-mile clip

7:13, equal to 70.4 miles per hour. His running was most consistent, his laps being 7:27, 7:14, 7:19, 7:17, 7:18, 7:17, 7:13 and 7:17—an average of 69.78 miles per hour for the distance he traveled.

Before this, however, there were others to fall by the way. On his third lap Aitken in the National went out with a cracked cylinder and the big blue car pulled up at the pit. In the same lap another star was eliminated when De Palma was put out with a broken flywheel. Close on the heels of these two mishaps came trouble for Wishart in the other Simplex, a burnt-out connecting rod bearing putting him out of the running when he was in second place. Then the race ran along to the twentieth lap before Hartman in the Alco was put out by a leaky gasoline line. At that time he was in fifth place.

All this time Buck was having tire troubles, much as did George Robertson a year ago in the Simplex. Even though the big Pope seemed to have plenty of speed the continual stops for tires put it out of the running. It was while Buck was fighting to make up some of this lost ground and perhaps get in for a position at the finish that the accident occurred on the back stretch. It was in his twenty-fifth lap and the big car was running over a fine stretch of road. The right front tire went and the Pope turned over completely and came up on its wheels again. Both Buck and mechanican Jacobs were hurled from the car. The mechanic was killed instantly but it was thought for a time that Buck's most serious injury was a broken thigh. He was taken to the hospital, where it developed that in addition his spine was broken and at 5:50 the end came.

While all this was going on Zengel, Grant and Hughes were battling for the cup. Lee and Hartman in the other Alcos never were important factors, but it did look for a time as if Grant might overtake Zengel. The Fairmount Park winner, however, was not to be denied. He kept everlastingly at it, never gave his rivals the least opening and from the time Mulford was eliminated to the end he always was in command. At the end of the twenty-first lap Zengel made his first stop, pulling up at the pit to take on gasoline. The next time around Grant came in and put on gasoline and water. Then the two again went at it hammer and tongs and at the thirty-second lap both made stops at the pit. Zengel took on a small quantity of gasoline, having heard a rattle in the tank that led him to believe his fuel was running low. This was not so, however, and he picked up the running again immediately. Hughes in the Mercer never stopped at the pits, but he did make one tire change along the course which did not take him long to accomplish.

The last lap was made interesting only by the fight for second place between Grant and Hughes. The Mercer went the last circuit 1 second faster than did the Alco, but that was not enough to land the place. Lee still was running and was in his thirty-third lap when Starter Wagner declared the race at an end.

The first day's racing was marked by the fact that all three winners—Herr, Hughes and Roberts—went through without a stop and also by the freedom from tire troubles, it being reported from the tire camps that only three cars suffered in this respect—two Stavers and Jenkins' Cole. The Stavers pinched tubes through not having racing rims, it is said. Not only did Herr go through without a falter, but Merz, his team mate, duplicated this feat. Merz was beaten 9 seconds for the cup and part of this loss is explained by his overrunning turns three times. Each time this meant a slight loss of which Herr took advantage. Merz often came by the stand at a tremendous clip and he testified to the great speed of the course by stating that several times he had the speedometer needle up to 100 miles an hour coming down the grade from Britton's hill to the stand. In this race the Stromberg $100 cash prize for the fastest lap was won by Herr, whose second lap in 7:23 was the best.

It was in the Kane County that the chief interest was shown, caused by the large field of starters. While Hughes was looked on as the favorite from the start, still it was thought he would have to fight to beat the Colbys, Coles and the others. The Staver people had hard luck in this. In the first place they were robbed by their best driver when Joe Nikrent, the Californian, was unable to start through having broken a belt in his engine base. Then Robillard went out when he hit a telegraph pole. This left only Monckmeier and that plucky youth kept plugging away and was the last one to catch the flag.

Of the eleven that started in this race, seven finished. Robillard went out in the seventh, as explained. Ogren, a new man in one of the Colbys, was eliminated by having his pistons seize

in the sixth lap. Armstrong, another Colbyite, was running in his fifteenth lap when the race ended. The fourth car was the Cino, which was put out in the seventh lap when Raimey's tire trouble in the backstretch caused the Cino to pitch them both out. Raimey was somewhat bruised and mechanician Radina broke an ankle. Hughes' sixteenth lap in 7:41 won the Stromberg $100 prize.

Roberts, in the Abbott-Detroit, drove a pretty race for the Aurora cup, although in the early stages it looked as if A. M. Robbins, the Abbott dealer, who was driving his first race, would win. Robbins had gained the lead and was in front at the end of the third lap. In the backstretch a bolt in his magneto coupling broke and he lost 9 minutes fixing it. That lost him the lead. Later on another bolt loosened and more time was lost. These were the only bits of trouble experienced by the three contestants throughout the race. None of them stopped for tires or for supplies. Kulick ran consistently but never got close enough to Roberts to worry him. Roberts' fourth lap in 9:00.19 was the fastest and captured the Stromberg prize.

The time made in all four races was a revelation and the fact that three course records were broken is sufficient reward for the Elginites, who spent $6,000 on the homestretch alone. In the big race Zengel averaged 66.45 miles per hour for the 305 miles, whereas last year Mulford did 62.5 for the same distance. It is more than likely that even this would have been beaten had Mulford stayed in Saturday, for while he was running he was going but a fraction less than 70 miles an hour. Zengel's consistent work was in keeping with the schedule he had laid out and possibly he could have done better had he been pushed. The Mercer's average in the big race was 64.54 miles an hour.

In the Illinois cup race Herr did 65.6 for the 202 miles, a big increase over last year's Illinois, in which Livingstone, in a National, averaged 60.6 miles an hour. In the Kane County Hughes averaged 63 miles an hour for the 169 miles, whereas last year Buck in the Marmon won at 55.1 miles per hour. Hearne in the Benz won the Fox River cup last year at 54.1 miles per hour, which was just a shade better than Roberts did Friday, the Abbott's average being 53.5 miles per hour.

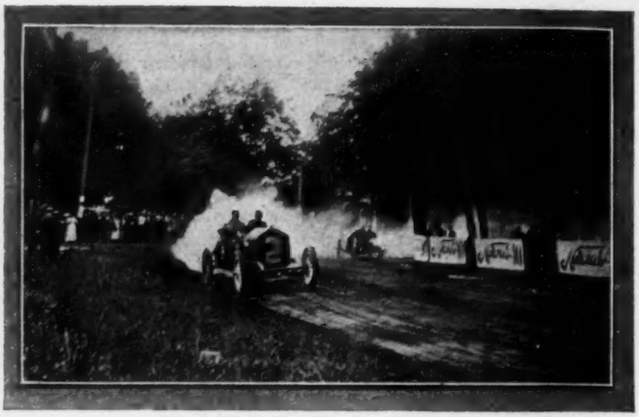
The manner in which the Chicago Motor Club handled the races was beyond any criticism—there wasn't a hitch anywhere. The guarding of the course was in keeping with the record made by the Illinois citizen-soldiery at Elgin last year and at Crown Point the year before. At all times the crowds were under perfect control and even when the grandstand fell there was no confusion or running across the course. The first day, perhaps, more soldiers could have been used but on the second day there were enough miliatiamen from the First Illinois Cavalry to give them complete command of the situation.

The timing and checking were first class. The Warner instrument was used in the timers' stand and not once did it slip a cog. There were eleven bulletin boards around the course on which the time was posted and so perfect did L. R. Campbell have his system working the second day that 70 seconds after a car crossed the tape at the finish of a lap the time was on all the boards around the course. The score boards were something new and those in the grandstand had a fine opportunity to study the scheme evolved by H. N. Fowler of the Chicago Motor Club. This big board was worked from behind. Under each car's number was a swinging board, pivoted in the center. The scorers placed the time on this board when it was turned to the rear by means of clips, the figures being already printed on cardboard. Then by swinging this little door it was turned to the front and the public could study the results easily.

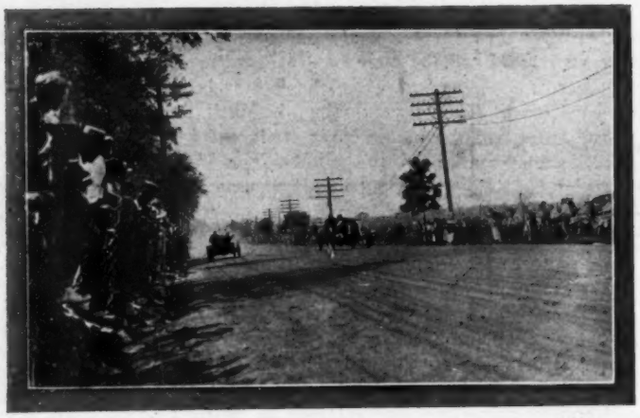
The transportation of the soldiers and flagmen was handled by John H. Kelly, who had at his command several big trucks loaned by Chicago dealers, and there never was a hitch there. J. S. Woodworth again handled the flagmen, all of whom were motorcyclists, and this department worked with exceeding smoothness. As for the press stand that was a commodious structure, two stories high. The Chicago newspapers had the first floor and each paper was allowed three representatives there. Upstairs were located the visiting newspaper men and the trade press. There were three rows of seats on each floor, each raised above the one in front so that everyone could see without having to stand up. This stand was filled with more than 200 newspaper men. The publicity department furnished them with all the times and in addition secured official details of all the happenings along the course.

Showing the Elgin course where it leads over the brow of Britton's Hill down toward the grandstand

View of the line of pits in front of the main grandstand



National (Zengel) leading Alco (Grant) in making the Hoornbeck's turn



Alco (Grant) and National (Aitken) on the new turn west of grandstand

Another innovation introduced by the Chicago Motor Club was a distinguished guests' stand in which were placed prominent car manufacturers and others whom the club desired to honor. This stand was well filled on both days and the makers appeared to appreciate the compliment, this being the first time those in the industry who are responsible for the racing have been specially cared for at big meets.

A coroner's inquest was held Saturday night in Elgin and the jury returned a verdict holding no one responsible for the death of Dave Buck. "Dave" appears to have been a nickname given the Pope-Hartford driver. His right name was Richard Dudley Buck and he was 36 years old, his birthplace being Buchanan, Mich. Jacobs, the mechanic, was a chauffeur for J. L. Russell, the Chicago agent for the Pope-Hartford, who entered the car in the race.

**RESULTS OF THE RACE FOR THE KANE COUNTY TROPHY FOR CARS OF FROM**

| Car.—Driver. | Lap No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| MERCER | Elap. Time | | 15:55 | 23:42 | 31:28 | 39:14 | 47:03 | 54:55 | 62:49 |
| Hughes | Lap Time | 7:50 | 8:05 | 7:47 | 7:46 | 7:46 | 7:49 | 7:52 | 7:54 |
| MERCER | Elap. Time | | 16:18 | 24:24 | 32:33 | 40:38 | 48:41 | 56:36 | 64:41 |
| Barnes | Lap Time | 8:12 | 8:06 | 8:09 | 8:09 | 8:05 | 8:03 | 7:55 | 8:05 |
| COLBY | Elap. Time | | 16:59 | 25:24 | 33:48 | 42:06 | 50:19 | 58:33 | 66:57 |
| Pearce | Lap Time | 8:35 | 8:24 | 9:05 | 8:24 | 8:18 | 8:13 | 8:14 | 8:24 |
| COLE | Elap. Time | | 17:02 | 25:27 | 33:52 | 42:16 | 50:37 | 59:04 | 67:32 |
| Jenkins | Lap Time | 8:40 | 8:22 | 8:25 | 8:25 | 8:24 | 8:21 | 8:27 | 8:28 |
| CORBIN | Elap. Time | | 16:24 | 24:34 | 32:42 | 40:49 | 49:05 | 57:12 | 65:30 |
| Maisonville | Lap Time | 8:15 | 8:09 | 8:10 | 8:08 | 8:07 | 8:16 | 8:07 | 8:18 |
| COLE | Elap. Time | | 21:58 | 30:44 | 39:12 | 47:40 | 56:08 | 65:05 | 73:59 |
| Morris | Lap Time | 8:47 | 13:11 | 8:46 | 8:24 | 8:28 | 8:28 | 8:57 | 8:54 |
| STAVER-CHI. | Elap. Time | | 16:40 | 24:47 | 32:50 | 40:55 | 59:32 | 67:51 | 76:17 |
| Monckmeier | Lap Time | 8:29 | 8:11 | 8:07 | 8:03 | 8:00 | 8:42 | 8:19 | 8:26 |
| COLBY | Elap. Time | | 22:42 | 33:43 | 46:24 | 60:29 | 71:01 | 84:11 | 106:56 |
| Armstrong | Lap Time | 11:53 | 10:49 | 11:01 | 12:41 | 14:05 | 10:32 | 13:10 | 22:45 |
| CINO | Elap. Time | | 17:36 | 31:04 | 40:26 | 49:21 | 58:08 | 67:03 | |
| Rainey | Lap Time | 8:57 | 8:39 | 13:28 | 9:22 | 8:55 | 8:47 | 8:55 | |
| STAVER-CHI. | Elap. Time | | 22:58 | 31:52 | 40:50 | 49:39 | 59:34 | 68:46 | |
| Robillard | Lap Time | 14:02 | 8:56 | 8:54 | 8:58 | 8:49 | 9:55 | 9:12 | |
| COLBY | Elap. Time | | 24:56 | 34:03 | 43:14 | 52:37 | | | |
| Ogren | Lap Time | 15:41 | 9:15 | 9:07 | 9:11 | 9:23 | | | |

**RESULTS OF RACE FOR ILLINOIS TROPHY FOR CARS OF FROM 301 TO 450 CUBIC INCHES DISPLACEMENT. 24 LAPS (203 MILES, 1896 FEET).**

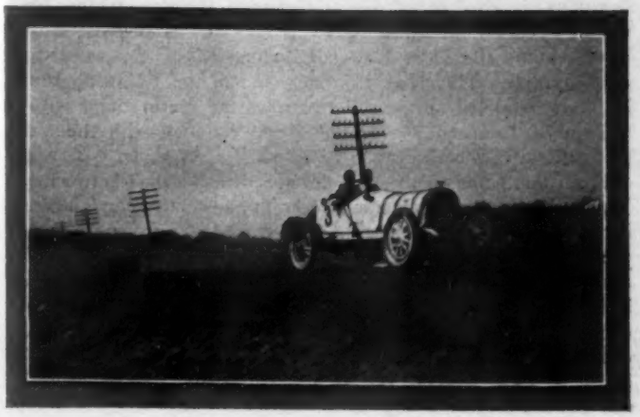
| Car.—Driver. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NATIONAL | Elap. time | | 15:00 | 22:41 | 30:40 | 38:25 | 46:08 | 53:47 | 61:23 | 69:09 | 77:09 | 85:11 | 92:58 | 100:43 | 108:31 | 116:16 | 124:01 | 131:42 | 139:22 | 147:03 | 154:45 |
| Herr ... | Lap. time | 7:37 | 7:23 | 7:41 | 7:59 | 7:45 | 7:43 | 7:39 | 7:36 | 7:46 | 8:00 | 8:02 | 7:47 | 7:45 | 7:48 | 7:45 | 7:45 | 7:41 | 7:40 | 7:41 | 7:42 |
| NATIONAL | Elap. time | | 15:28 | 23:03 | 30:39 | 38:18 | 46:03 | 53:37 | 61:16 | 69:21 | 77:51 | 86:04 | 94:01 | 101:37 | 109:08 | 116:36 | 124:16 | 132:05 | 139:56 | 147:39 | 155:10 |
| Merz .. | Lap. time | 7:46 | 7:42 | 7:35 | 7:36 | 7:39 | 7:45 | 7:34 | 7:39 | 8:05 | 8:30 | 8:13 | 7:57 | 7:36 | 7:31 | 7:28 | 7:40 | 7:49 | 7:51 | 7:43 | 7:41 |
| VELIE ... | Elap. time | | 21:40 | 31:18 | 40:27 | 49:32 | 58:33 | 67:39 | 76:53 | 85:56 | 95:07 | 106:51 | 116:02 | 124:54 | 133:51 | 142:39 | 151:30 | 160:27 | 169:20 | 178:10 | 186:59 |
| Jeffkins | Lap. time | 9:14 | 12:26 | 9:38 | 9:09 | 9:05 | 9:01 | 9:06 | 9:14 | 9:03 | 9:11 | 11:44 | 9:11 | 8:52 | 5:57 | 8:48 | 8:51 | 8:57 | 8:53 | 8:50 | 8:49 |
| VELIE .. | Elap. time | | 16:27 | 30:08 | 61:56 | 70:12 | 78:33 | 86:41 | 94:49 | 103:02 | 111:09 | 119:32 | 138:08 | 146:25 | 154:28 | 162:46 | 170:51 | 159:16 | Still running | | |
| Stickney | Lap. time | 8:26 | 8:01 | 13:41 | 31:48 | 8:16 | 8:21 | 8:04 | 8:08 | 8:13 | 8:07 | 8:23 | 18:36 | 8:17 | 8:03 | 8:18 | 8:05 | 8:15 | | | |

Herr, National No. 1 fast lap 2nd, 7:23.

**TABLE SHOWING THE STANDING OF EACH OF THE CONTESTING CARS WHICH STARTED IN THE RACE FOR THE**

| Car—Driver. | Lap No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NATIONAL | Elapsed time | | 15:07 | 22:33 | 30:27 | 37:53 | 45:17 | 52:48 | 60:20 | 67:50 | 75:16 | 82:46 | 90:24 | 97:57 | 105:29 | 113:07 |
| Len Zengel | Lap time | 7:39 | 7:28 | 7:26 | 7:54 | 7:26 | 7:24 | 7:31 | 7:32 | 7:30 | 7:26 | 7:30 | 7:38 | 7:33 | 7:32 | 7:38 |
| ALCO | Elapsed time | | 15:23 | 22:58 | 30:35 | 38:13 | 45:52 | 53:35 | 61:21 | 69:06 | 76:50 | 84:25 | 92:00 | 99:35 | 107:18 | 115:02 |
| Harry F. Grant | Lap time | 7:43 | 7:40 | 7:35 | 7:37 | 7:38 | 7:39 | 7:43 | 7:46 | 7:45 | 7:44 | 7:35 | 7:35 | 7:35 | 7:43 | 7:44 |
| MERCER | Elapsed time | | 15:44 | 23:27 | 31:09 | 38:53 | 46:35 | 54:18 | 62:00 | 69:52 | 77:40 | 85:29 | 94:52 | 102:39 | 110:28 | 118:16 |
| Hugh Hughes | Lap time | 7:58 | 7:46 | 7:43 | 7:42 | 7:44 | 7:42 | 7:43 | 7:42 | 7:52 | 7:48 | 7:49 | 9:23 | 7:47 | 7:49 | 7:48 |
| ALCO | Elapsed time | | 18:46 | 26:44 | 34:40 | 42:37 | 50:53 | 58:53 | 68:31 | 76:27 | 84:25 | 93:13 | 109:34 | 119:06 | 127:00 | 134:47 |
| Frank Lee | Lap time | 8:12 | 10:34 | 7:58 | 7:56 | 7:57 | 8:16 | 8:01 | 9:38 | 7:56 | 7:58 | 8:48 | 16:21 | 9:32 | 7:54 | 7:47 |
| POPE-HARTFORD | Elapsed time | | 25:53 | 38:08 | 56:20 | 74:29 | 83:22 | 91:08 | 99:19 | 110:22 | 118:26 | 126:15 | 134:10 | 147:36 | 156:33 | 164:31 |
| Dave Buck | Lap time | 8:58 | 16:45 | 12:15 | 18:12 | 18:09 | 8:53 | 7:46 | 8:11 | 11:03 | 8:04 | 7:49 | 7:55 | 13:26 | 8:57 | 7:58 |
| ALCO | Elapsed time | | 15:41 | 23:29 | 31:16 | 39:06 | 46:53 | 54:40 | 62:26 | 70:15 | 78:01 | 85:48 | 93:35 | 101:23 | 109:12 | 117:11 |
| Harry Hartman | Lap time | 7:56 | 7:45 | 7:48 | 7:47 | 7:50 | 7:47 | 7:47 | 7:46 | 7:49 | 7:46 | 7:47 | 7:47 | 7:48 | 7:49 | 7:59 |
| LOZIER | Elapsed time | | 14:41 | 22:00 | 29:17 | 36:35 | 43:52 | 51:05 | 58:22 | } Out—Cracked cylinder. | | | | | | |
| Ralph Mulford | Lap time | 7:27 | 7:14 | 7:19 | 7:17 | 7:18 | 7:17 | 7:13 | 7:17 | | | | | | | |
| SIMPLEX | Elapsed time | | 15:11 | 22:42 | 30:15 | } Out—Broken connecting rod. | | | | | | | | | | |
| Spencer Wishart | Lap time | 7:39 | 7:32 | 7:31 | 7:33 | | | | | | | | | | | |
| SIMPLEX | Elapsed time | | 15:21 | } Out—Flywheel broken. | | | | | | | | | | | | |
| Ralph De Palma | Lap time | 7:41 | 7:40 | | | | | | | | | | | | | |
| NATIONAL | Elapsed time | | 20:23 | } Out—Burnt out connecting rod bearing. | | | | | | | | | | | | |
| John D. Aitken | Lap time | 11:38 | 8:45 | | | | | | | | | | | | | |

Zengel stopping at the pits to replenish his gasoline supply



Buck in Pope-Hartford in full flight a minute before the fatal accident

# How the Races Were Won

## Illinois Trophy

Two Nationals and a pair of Velies were the only contestants in this event. The first time around the Herr National had gained 9 seconds on its teammate followed by Velie No. 4, with the Jeffkins Velie, well up, in the rear. At the end of the second round the Herr National, with one of the fastest laps of the race, swung into the lead, Merz falling into second place, the Stickney Velie and its mate following in the order named. This order was maintained throughout the third lap, at the conclusion of which Herr was leading his teammate by 22 seconds, with the Velie pair far behind. The conclusion of the fourth round saw Merz leading Herr by the smallest possible margin, with the rest of the field maintaining their respective

Some of the officials who so successfully managed the Elgin races

**231 TO 300 CUBIC INCHES DISPLACEMENT. 20 LAPS (169 MILES, 2460 FEET).**

| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70:51 | 78:49 | 86:52 | 94:45 | 102:46 | 110:46 | 118:36 | 126:17 | 134:00 | 141:46 | 149:37 | 157:21 |
| 8:02 | 7:58 | 8:03 | 7:53 | 8:01 | 8:00 | 7:50 | 7:41 | 7:43 | 7:46 | 7:51 | 7:44 |
| 72:50 | 80:51 | 88:55 | 96:46 | 104:44 | 112:42 | 120:33 | 128:30 | 136:23 | 144:15 | 152:04 | 159:55 |
| 8:09 | 8:01 | 8:04 | 7:51 | 7:58 | 7:58 | 7:51 | 7:57 | 7:53 | 7:52 | 7:49 | 7:51 |
| 75:11 | 83:29 | 91:42 | 99:56 | 108:12 | 116:37 | 124:58 | 133:15 | 141:46 | 149:58 | 158:05 | 166:11 |
| 8:14 | 8:18 | 8:13 | 8:14 | 8:16 | 8:25 | 8:21 | 8:17 | 8:31 | 8:12 | 8:07 | 8:06 |
| 76:00 | 84:33 | 93:00 | 101:24 | 109:47 | 118:09 | 126:28 | 134:47 | 143:05 | 151:27 | 159:50 | 168:19 |
| 8:28 | 8:33 | 8:27 | 8:24 | 8:23 | 8:22 | 8:19 | 8:19 | 8:18 | 8:22 | 8:23 | 8:29 |
| 74:15 | 85:53 | 102:08 | 110:19 | 118:39 | 126:48 | 135:22 | 143:32 | 151:46 | 160:04 | 168:18 | 177:12 |
| 8:45 | 11:38 | 16:15 | 8:11 | 8:20 | 8:09 | 8:34 | 8:10 | 8:14 | 8:18 | 8:14 | 8:54 |
| 82:58 | 91:40 | 100:18 | 109:05 | 117:42 | 126:13 | 134:44 | 143:20 | 151:50 | 160:24 | 168:56 | 177:37 |
| 8:59 | 8:42 | 8:38 | 8:47 | 8:37 | 8:31 | 8:31 | 8:36 | 8:30 | 8:34 | 8:32 | 8:41 |
| 84:47 | 93:03 | 101:22 | 109:37 | 118:08 | 126:29 | 134:46 | 145:09 | 153:33 | 161:51 | 170:05 | 178:16 |
| 8:30 | 8:16 | 8:19 | 8:15 | 8:31 | 8:21 | 8:17 | 10:23 | 8:24 | 8:18 | 8:14 | 8:11 |
| 120:40 | 133:46 | 148:18 | 160:33 | 171:53 | 183:09 | 15: | | | | | |
| 13:44 | 13:06 | 14:32 | 12:15 | 11:20 | 11:16 | | | | | | |

| 21 | 22 | 23 | 24 |
|---|---|---|---|
| 162:26 | 170:05 | 177:55 | 185:55 |
| 7:41 | 7:39 | 7:50 | 8:00 |
| 162:53 | 170:40 | 178:22 | 186:04 |
| 7:43 | 7:47 | 7:42 | 7:42 |
| Still running. | | | |

**RESULTS OF RACE FOR AURORA TROPHY FOR CARS OF FROM 161 TO 230 CUBIC INCHES DISPLACEMENT. 16 LAPS (135 m., 3024 ft).**

| Car.—Driver. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABBOTT-DET. | Elap. time | | 18:23 | 28:32 | 37:32 | 48:42 | 55:54 | 65:05 | 74:37 | 84:01 | 93:11 | 102:40 | 112:28 | 122:05 | 131:42 | 141:23 | 151:11.32 |
| Mort. Roberts | Lap. time | 9:13 | 9:10 | 10:09 | 9:00 | 9:10 | 9:12 | 9:11 | 9:32 | 9:24 | 9:10 | 9:29 | 9:48 | 9:37 | 9:37 | 9:41 | 9:48 |
| ABBOTT-DET. | Elap. time | | 18:58 | 28:15 | 47:26 | 60:04 | 69:23 | 78:44 | 88:11 | 97:36 | 106:51 | 116:14 | 125:34 | 134:51 | 144:39 | 154:01 | 166:56.52 |
| A. M. Robbins | Lap. time | 9:37 | 9:19 | 9:17 | 19:11 | 12:38 | 9:17 | 9:21 | 9:27 | 9:25 | 9:15 | 9:23 | 9:20 | 9:17 | 9:48 | 9:22 | 12:55 |
| FORD ..... | Elap. time | | 19:53 | 29:38 | 39:31 | 49:27 | 59:20 | 69:10 | 79:11 | 88:56 | 98:57 | 109:00 | 118:59 | 129:04 | 139:08 | 149:08 | 159:11.53 |
| F. Kulick .. | Lap. time | 10:02 | 9:51 | 9:45 | 9:53 | 9:56 | 9:53 | 9:50 | 10:01 | 9:45 | 10:01 | 10:03 | 9:59 | 10:05 | 10:04 | 10:00 | 10:03 |

**ELGIN NATIONAL TROPHY FOR CARS UNDER 600 INCHES DISPLACEMENT. 36 LAPS (305 MILES, 204 FEET).**

| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120:42 | 128:21 | 135:57 | 143:31 | 151:02 | 159:30 | 167:13 | 174:44 | 182:17 | 189:55 | 197:31 | 265:09 | 212:50 | 220:29 | 228:12 | 235:49 | 244:16 | 252:08 | 259:54 | 267:44 | 275:39.08 |
| 7:35 | 7:39 | 7:36 | 7:34 | 7:31 | 8:28 | 7:43 | 7:31 | 7:33 | 7:38 | 7:36 | 7:38 | 7:41 | 7:39 | 7:43 | 7:39 | 8:27 | 7:52 | 7:46 | 7:50 | 7:55 |
| 122:45 | 130:31 | 138:09 | 145:38 | 153:14 | 160:51 | 170:44 | 178:25 | 186:15 | 193:55 | 201:39 | 209:24 | 217:10 | 224:52 | 232:37 | 240:25 | 250:42 | 258:33 | 266:25 | 274:14 | 281:58.72 |
| 7:43 | 7:46 | 7:38 | 7:29 | 7:36 | 7:37 | 9:53 | 7:41 | 7:50 | 7:40 | 7:44 | 7:45 | 7:46 | 7:42 | 7:45 | 7:48 | 10:17 | 7:51 | 7:51 | 7:50 | 7:44.72 |
| 126:25 | 134:09 | 141:54 | 149:40 | 157:27 | 165:16 | 173:03 | 182:01 | 189:46 | 197:34 | 205:14 | 212:55 | 220:32 | 228:09 | 235:43 | 243:30 | 251:07 | 258:49 | 266:41 | 274:26 | 282:08.97 |
| 8:09 | 7:44 | 7:45 | 7:46 | 7:47 | 7:49 | 7:47 | 8:58 | 7:45 | 7:48 | 7:40 | 7:41 | 7:37 | 7:37 | 7:34 | 7:47 | 7:37 | 7:42 | 7:52 | 7:45 | 7:43.97 |
| 142:34 | 150:21 | 158:09 | 170:14 | 178:14 | 186:28 | 194:28 | 205:14 | 213:09 | 225:38 | 233:34 | 241:19 | 249:22 | 257:18 | 265:24 | 273:41 | 285:45.15 | | | | |
| 7:47 | 7:47 | 7:48 | 12:05 | 8:00 | 8:14 | 8:00 | 10:46 | 7:55 | 12:29 | 7:56 | 7:45 | 8:03 | 7:56 | 8:06 | 8:17 | 12:04.15 | | | | |
| 172:43 | 183:31 | 191:19 | 199:07 | 206:58 | 214:49 | 222:42 | 230:33 | 238:36 | Turned over on the back stretch. | | | | | | | | | | | |
| 8:12 | 10:48 | 7:48 | 7:48 | 7:51 | 7:51 | 7:53 | 7:51 | 7:53 | | | | | | | | | | | | |
| 128:42 | 136:34 | 144:24 | 153:51 | 165:44 | Out—Leak in gasoline line. | | | | | | | | | | | | | | | |
| 11:31 | 7:52 | 7:50 | 9:27 | 11:53 | | | | | | | | | | | | | | | | |

positions. This order was maintained throughout the fifth, sixth, seventh and eighth rounds. The end of the last named circuit found the Merz National leading by the meager margin of 7 seconds. This lead was overcome in the following round by Herr, who led at the conclusion of the ninth round with a margin of 12 seconds over the Merz National, with the Velie pair still falling back.

From this point on the race developed into a duel between the National pair for the honors, Herr in the tenth round increasing his lead to 42 seconds, to 53 seconds at the conclusion of the eleventh lap and to 63 seconds at the end of the twelfth round. In the thirteenth and fourteenth circuits Merz reduced his teammate's lead by a few seconds and was slowly but surely closing up the gap that separated him from the leader. The conclusion of round fifteen saw the Herr National leading by but a scant 20 seconds, which was still further reduced at the end of the sixteenth lap to 15 seconds. The Herr National gained slightly on the Merz car in the seventeenth, eighteenth and nineteenth rounds, but lost a trifle on the twentieth, Herr's lead at the conclusion of that lap being an even 25 seconds. Rounds twenty-one and twenty-two found Herr hanging on to his meager advantage with bulldog tenacity, the small margin of 35 seconds being all that separated the blue pair.

At this point Merz began a determined effort to overtake his mate, gaining 8 seconds on the next to the last round. When the times of the contending pair had been taken at this point it was seen that the Herr National had a lead of but 27 seconds and Merz went out to cut that down if possible. Herr was equally insistent on maintaining his advantage, and although Merz steadily but none the less surely gained ground he was unable to overcome the lead of his opponent. At the start of the race the Herr National had been sent away 30 seconds in advance of the National No. 3 and thousands of watches were flashed in the effort to keep tab on the flying pair. When Herr crossed the line in 185:55, thousands of glasses were leveled at the course to watch for the appearance of National No. 3 over the brow of Britton's hill. Slowly the seconds ticked off and just as 30 seconds had elapsed the blue bonnet of No. 3 shot into sight and came down the stretch at express speed, too late, however to win the race, Merz falling short of the goal by a scant 9 seconds.

Although the Velie pair was still running at the conclusion of the race, No. 2 had completed but 20 laps and No. 4 but 16.

## Kane County Trophy

Eleven of the sixteen cars originally entered in the race for the Kane County cup faced the starter, the three Falcars having been withdrawn and the Staver-Chicago No. 16 and Cino No. 26 having been prevented from starting by accidents in practice earlier in the week. Mercer No. 15, driven by Hughie Hughes, jumped into the lead at once, gaining a substantial lead in the first lap over Cole No. 24 driven by Jenkins, which led Corbin No. 14 by a scant second, with Cino No. 11 close up and the Barnes Mercer trailing along behind the Cino. At the end of the second lap, however, Hughes' teammate swung into second position, being but 23 seconds behind the leader, the Corbin still maintaining third position, Staver-Chicago No. 27 moving up to fourth, Colby No. 20 into fifth and Cole No. 24 dropping back into the sixth notch. These relative positions of the contestants were maintained until the conclusion of the ninth round, Colby No. 18 having meanwhile dropped out at the sixth lap with a seized piston, Fred Robillard in a Stayer-Chicago No. 25, coming to grief on the following lap when his car cut down a telegraph pole on the Hoornbeck turn as a result of a tire coming loose, and Ramey, in a Cino, also being eliminated when his car skidded on the backstretch, breaking his mechanician's leg.

The conclusion of the tenth circuit found the Hughes Mercer leading its teammate by 2 minutes, 2 seconds, Colby No. 20 being over 2 minutes behind the Barnes Mercer and Cole No. 24 about a minute behind Colby No. 20. For round after round the Mercer pair added to their lead over the other contestants, Hughes maintaining an advantage of about 2 minutes over his teammate throughout. From the sixteenth lap on to the finish Hughes gained steadily and the conclusion of the race showed him with an advantage of 2 minutes 34 seconds over Barnes, who in turn was 6 minutes 16 seconds ahead of Colby No. 20, which led Cole 24 by 2 minutes 8 seconds. Corbin No. 14, Cole No. 21 and Staver-Chicago No. 27, all completed the entire 20 laps, the latter being about 20 minutes behind the leader. Colby No. 22 was still running at the conclusion of the race, but was nearly 6 laps behind.

The performance of the leaders was remarkable for the almost entire absence of trouble of any kind, neither of the Mercer pair having been compelled to stop either at the pits or on the course for any reason.

## Aurora Trophy

There were but three entries in the race for the Aurora cup, Ford No. 32, driven by Kulick, being opposed by a pair of Abbott-Detroits—No. 3, driven by Mortimer Roberts and No. 31 by Robbins. At the end of the first round Roberts, who had started 30 seconds behind his teammate, had almost overtaken him, crossing the tape the first time around but 4 seconds behind and overcoming the 15-second start of the Ford on the backstretch. The second round saw Roberts with a clear lead of 35 seconds over Robbins, with the Ford almost a minute behind. On the third round Roberts was compelled to stop at the pits and Robbins swung into the lead having an advantage of 17 seconds at the close of the lap. Roberts, however, soon regained the lead owing to the combination of a fast lap and magneto trouble experienced by his teammate on the backstretch. A repetition of the same trouble on the fifth lap caused Robbins to lose still more ground, his place as runner-up having been assumed by the Ford at the conclusion of the fourth round, from which point the order was Abbott-Detroit 33, Ford 32 and Abbott-Detroit 31 to the end of the race. With each succeeding lap Roberts added about 1-2 minute to his lead over the Ford and at the close of the race had a lead of 8 minutes over Kulick's car. At the end of the fifth lap the Ford had an advantage of more than 10 minutes over Robbins' car, and although the latter from that point onward gained ground consistently on its little rival it was unable to overcome the handicap caused by mechanical troubles in the early rounds of the race, and finished about 7 3-4 minutes behind the Ford.

## Elgin National Trophy

When the cars lined up for the start of the big race it was noticed that the Cino pair, which had suffered severely in the previous day's races, had been scratched. This left ten cars in the field as follows: Alco No. 1, driven by Grant; No. 2 National, Zengel; No. 3 Pope-Hartford, Buck; No. 4 Simplex, Wishart; No. 5 Alco, Lee; No. 6 National, Aitken; No. 7 Alco, Hartman; No. 9 Mercer, Hughes; No. 11 Simplex, DePalma, and No. 12 Lozier, Mulford. The latter, starting out with the evident determination of not alone winning the race but of breaking all records as well, covered the initial circuit in 12 seconds less than his nearest rivals, National No. 2 and Simplex No. 4. DePalma's Simplex negotiated the round 14 seconds slower than did the leader, followed by Grant's Alco, Hartman's Alco, the Mercer, Lee's Alco, the Pope-Hartford and the Aitken National in the order named. The second round saw Mulford add still more to his lead, the end of that circuit showing him to be 26 seconds in advance of Zengel, who had displaced Wishart in the Simplex as runner-up. De Palma still maintained fourth position, with the Grant Alco in fifth place, 2 seconds behind, the remainder of the contestants trailing. The third round witnessed the elimination of two dark horses, Aitken's National going out with a cracked cylinder and De Palma's Simplex retiring to the side lines with a broken flywheel. At the conclusion of this round Mulford's advantage had been increased to 33 seconds over the Zengel National,

(*Continued on page 366.*)

# How to Avoid Jersey on Tour South

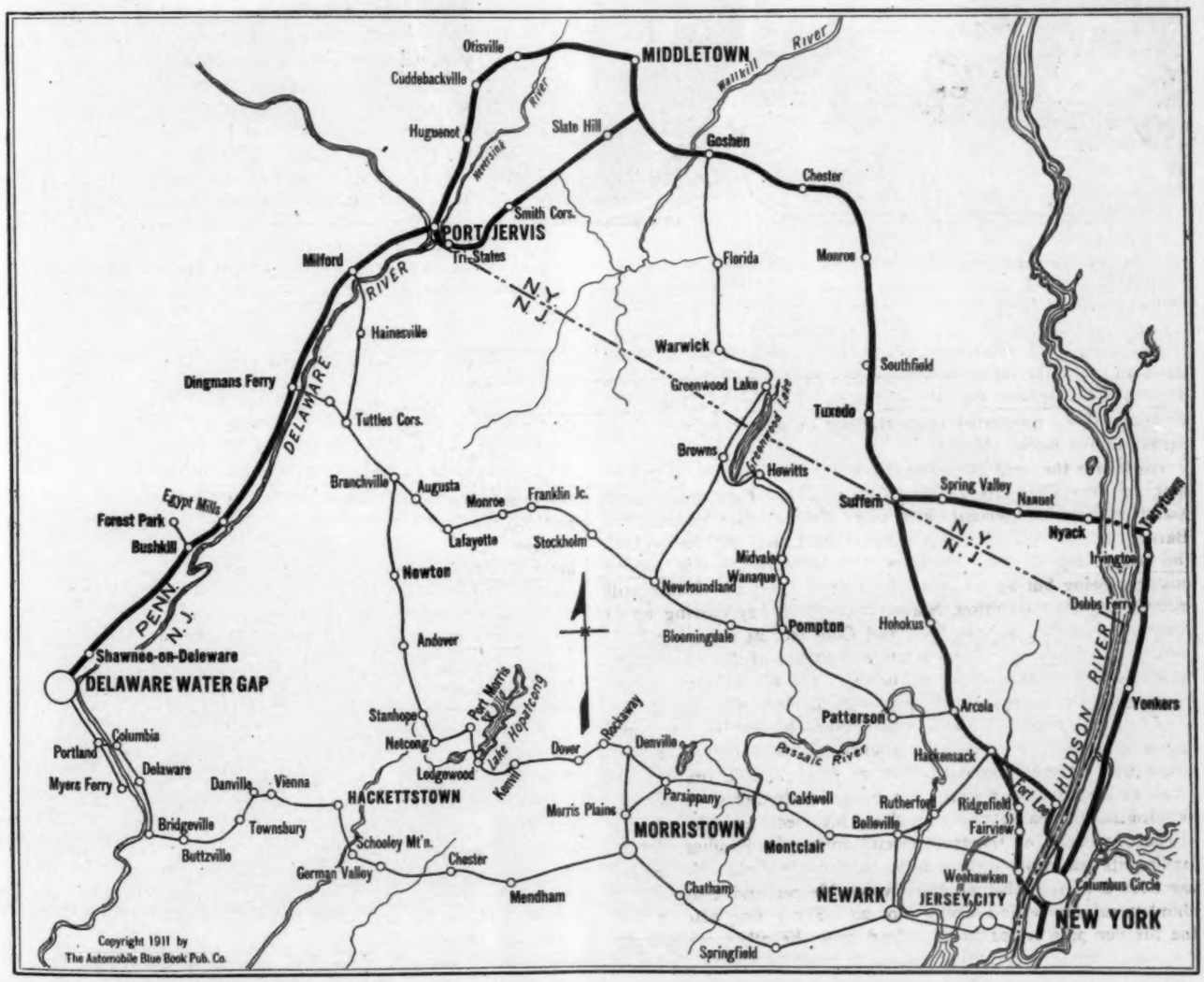
## Delightful Trip Promises Much Pleasure

*Embarrassments that confront automobilists in New Jersey under the present law may be avoided only by avoiding the State, and the accompanying article and illustrations show a diversity of routes around that State. The general directions are recommended by the Blue Book and the Touring Club of America.*

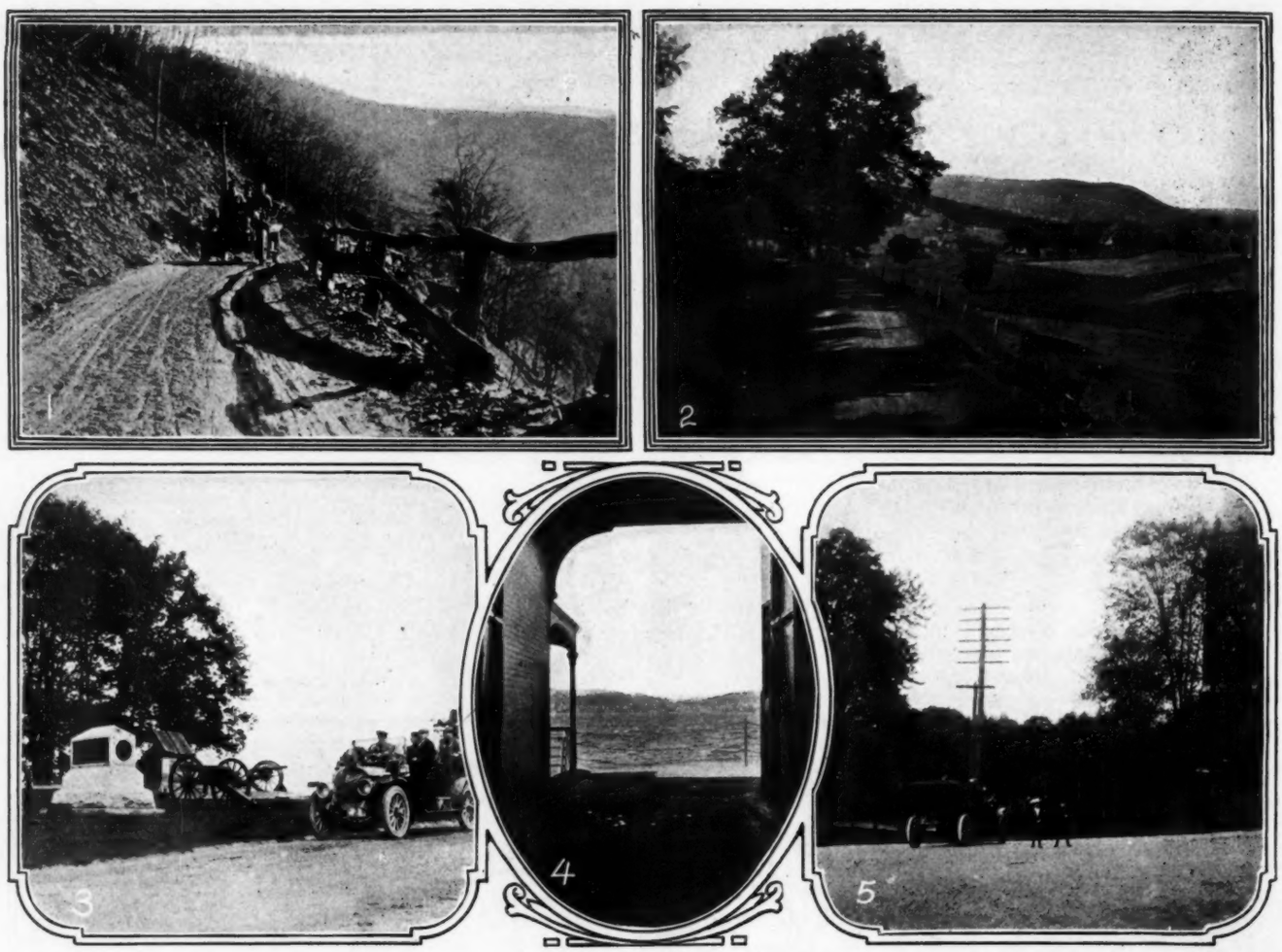
TO go south from New York City without traversing New Jersey and getting the license required there is a problem very easily solved by taking the road to Tarrytown and crossing the Hudson to Nyack, Suffern and Middletown. In Volume I of the *Blue Book* this is Route 31, the all-New York route to Port Jervis, 96.3 miles. It is fine macadam practically all the way.

Few people will realize without a glance at the map that this variant is only 20 miles farther than the route via Hackensack and Suffern. In addition it is a more interesting country over which better time can be made. Except for those motorists who must take the most direct route to Philadelphia and vicinity this is a trip to be recommended. For the tourist who has leisure and no enthusiastic desire to "fork over" the requisite for a Jersey license it is the preferable way.

Leaving Manhattan by way of Riverside Drive and Broadway, the latter is followed all the way through Yonkers. En route Spuyten Duyvil Creek is crossed, so titled because a Dutchman swore to cross "en spuyt den Duyvil." There is a modern application of this phrase in taking this particular run "around New Jersey." At Yonkers is the old Manor House, now City Hall, while beyond at Dobb's Ferry a tablet marks Washington's head-




MAP SHOWING HOW THE AUTOMOBILE TOURIST MAY AVOID PUTTING TIRES IN THE SACRED PRECINCT OF JERSEY



1—After leaving the giant steel mills at Bethlehem, Pa.

2—A New York hillside road traversing a scene of peaceful beauty

3—Gettysburg, where Blue and Gray joined battle that shook the foundations of civilization

4—Nyack-on-Hudson, where Aviator Atwood made his last intermediate stop on his flight

5—Tarrytown, N. Y., one of the first and most beautiful of the road scenes to be enjoyed

quarters in 1781. Beginning here the lake-like widening of the Hudson River is called Tappan Zee, along which are situated Irvington, Tarrytown and Piermont, Nyack and Sing Sing. The Zee is ten miles long, and is crossed by ferry at Tarrytown to Nyack, three miles across.

All this region has been made classic by the pen of Washington Irving, one of the few American writers to achieve international reputation. His home, Sunnyside, is at Irvington, and is covered with ivy from a sprig presented by Sir Walter Scott. Paulding Manor and Lynnhurst, the residence of Jay Gould, are near by. In fact, it was said fifteen years ago that in the six miles between Dobb's Ferry and Tarrytown are the country houses of sixty-three millionaires, whose united fortunes exceeded $500,000,000. At Tarrytown is the estate of William Rockefeller, called Rockwood Hall.

Perhaps the most interesting place on the trip is Tarrytown. There is a monument commemorating the capture of Major Andre, and here is Sleepy Hollow, within whose immortal shadows stands the old Dutch Church (1699). In the churchyard Irving lies buried.

Running west from Nyack the car passes through a comfortable district into Suffern, on the New Jersey line, a small village, but a tourist center because of good roads diverging in five directions. On to Tuxedo, the most magnificent of suburbs, the route follows the Ramapo River. Beyond "Arden," the home of the late E. H. Harriman, turn left into Monroe, Chester and Goshen, thence to Middletown, up a beautiful valley into Port Jervis.

Port Jervis is at the junction of the three States, New York, New Jersey and Pennsylvania. The route to Binghamton, yet in its formative stage, will be the most important connection for travel to Syracuse and Rochester. Port Jervis is also in touch with the favorite section of the Delaware through Milford and Bushkill. All the west side of the river is bordered by natural shale, making a clean, smooth road, free from dust and not slippery. Some dangerous curves are encountered along this stretch of 27 miles, but accidents are few in spite of the constant stream of travel clear into late Fall.

An interesting old Indian fort is to be found across the old Barrett Toll Bridge which crosses the Delaware River into Pennsylvania, and there are a number of beautiful drives from Port Jervis along the Neversink Valley, Hawk's Nest Road and to Saw Kill Falls. High Point (1,600 ft.) is a picturesque resort, as is Lake Marcia, four miles to the east on the ridge of the Kittatinny Mountains.

Seven miles from Port Jervis is Milford, notable for the magnificent Pinchot Mansion with its fine driveway. The experiment station of the Yale School of Forestry is also located here. Numerous waterfalls are worthy of remark on this trip to Dingman's Ferry, with its old ferry and ruined bridge beside a modern iron one. Presently the Delaware makes its famous bend at Fiddler's Elbow, beyond which lies Bushkill, at the junction of the Big and Little Bushkill Creeks. The Falls of the latter are beauties.

Five miles beyond, at the fork near Delaware Valley Inn, the left road leads to Delaware Water Gap and the right turn

leads to Stroudsburg. Various routes lead from these tourist centers to Wilkes-Barre, and Scranton or Easton and Reading southward.

Suppose that one had in view a trip to Washington or Richmond and Old Point Comfort. From the Gap a desirable route runs via Easton and Reading to Gettysburg. Fair dirt roads, numerous grades and bad water-bars characterize the 23 miles to Easton via Portland and Richmond, but the last ten miles are macadam. Easton is a manufacturing town on whose heights are located the buildings of Lafayette College, chartered in 1826. Good roads radiate to New York, Harrisburg, Philadelphia, Scranton. Leaving Easton on fine macadam which continues for 27 miles on the way to Reading, one passes through Moravian settlements, Nazareth and Bethlehem. From Allentown a fine road is followed through Kutztown, near the famous crystal cave, into Reading, a manufacturing city of German origin.

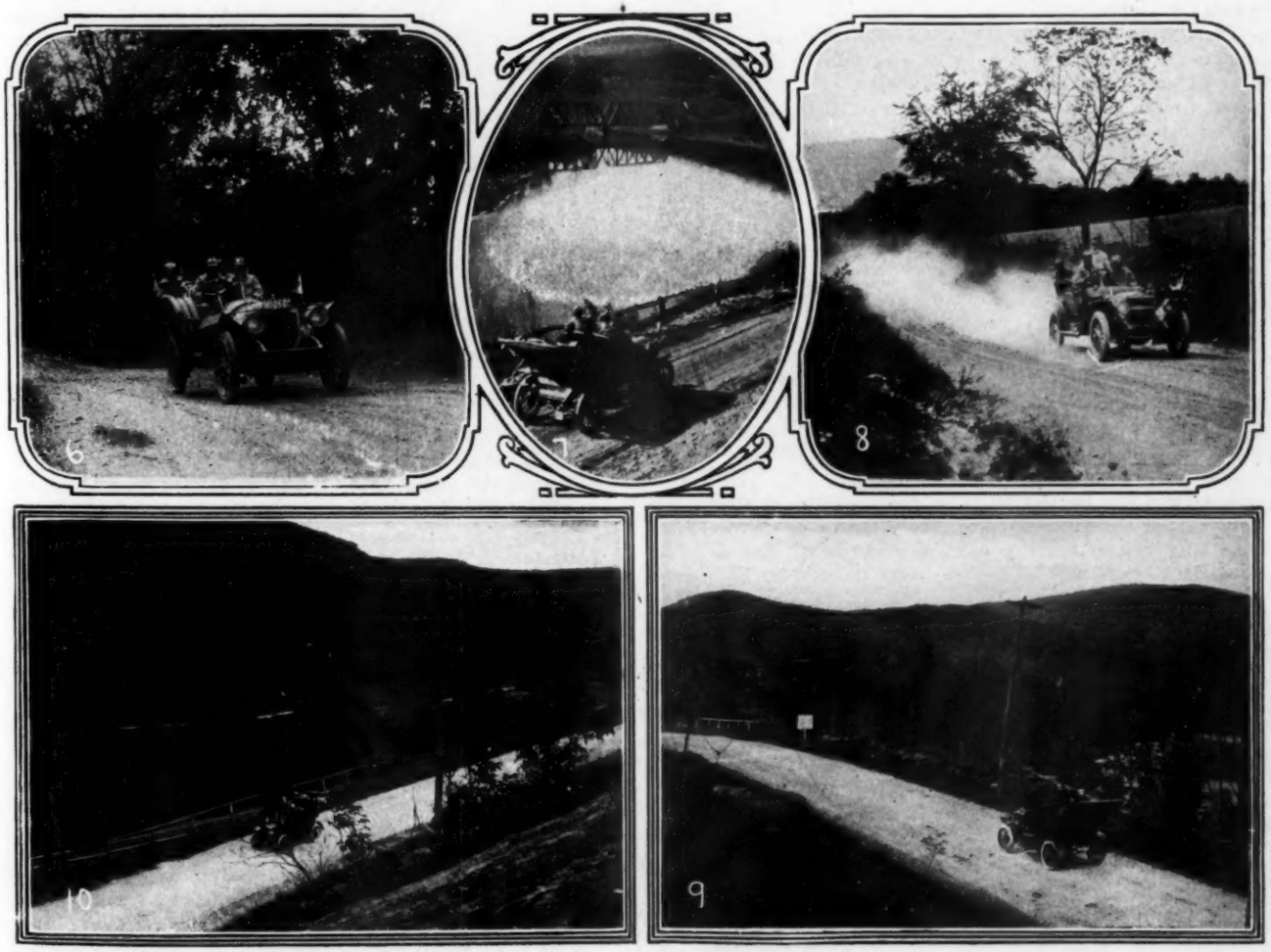
Southwest to Lancaster fair-to-good roads and pike with some stretches of macadam are covered; thence via York to the scene of the great Gettysburg battlefield of the Civil War, now fitly commemorated.

Whether one goes direct to Washington via Frederick on the fair pike, bad when wet, or takes the somewhat better route through Littletown and Westminster to Baltimore, considerable toll must be paid in Maryland. However, one hears occasionally that tolls are abolished, as, for instance, the two tollgates between Frederick and Knoxville, a road which is being macadamized.

The route from Washington to Richmond has been very recently described in THE AUTOMOBILE, and the most recent information regarding it may be obtained from the Touring Club of America. Starting east, then, on Broad street from Richmond, the notable battlefield of Seven Pines is passed on the 56-mile run to Williamsburg, on the peninsula. This was the ancient capital of the State and the seat of the Colonial Government. Points of interest are the Powder Magazine of 1714, old Christ's Church and the College of William and Mary, chartered 1693.

Forty miles out is Old Point Comfort, reached via Hallstead's Point. Warwick, Newport News and Hampton. St. John's Episcopal Church, built in 1658, of red and gray English brick, is one of the sights of Hampton, having a memorial window commemorating the baptism of Pocahontas. For it was her beloved Captain John Smith who sighted Old Point Comfort in 1678, and so named it in spite of the difficulties he subsequently encountered. Fort Monroe is, of course, one of the show places of the coast. Either the fine old fort or the large garrison attracts many visitors. And it is not without a thrill that the tourist looks out upon Hampton Roads, the scene of the engagement between the Monitor and Merrimac.

The Delaware capes and the resorts along the Chesapeake are particularly attractive late in the Summer and early in the Fall and all of them can be reached by the routes indicated herewith. The trip from New York to Old Point Comfort, via Port Jervis, Harrisburg and the south shore should make a delightful four-day tour. Of course it would be shorter via Jersey and will be as soon as the present law is changed.



6—As the road winds away from York, Pa., through tree arches

7—Nazareth, Pa., a picturesque incident along the way

8—One of the routes out of Harrisburg, Pa., showing a bit of river and hill scenery

10—Passing Turner, N. Y., near Tuxedo, the millionaires' resort

9—Skirting the northern hills of the Ramapo mountains

# The Rating of Gasoline Motors

## Method Suggested by C. F. Dendy Marshall, B. A.

*The rating of gasoline motors has occupied the minds of several of the leading technicians connected with the automobile art, but up to the present nothing definite has been evolved that will suit the ideas of everyone concerned. Simplicity of some formulæ brings with it drawbacks, while the complication of others renders them unsuitable. The suggestion contained in this article appeared in the "Automobile Engineer."*

IT is impossible to devise a horsepower formula which will do more than give an approximation. Consequently anything in the nature of complications should be avoided, unless they are justified by unmistakable superiority. The same consideration applies to factors like d + a constant, where d is the diameter, and also to roots of the stroke, etc., which cannot be defended on any ground except that they profess to be based on the careful observation of different engines. I use the word profess advisedly, because anything more inconclusive than the first three diagrams in the recently issued report of the Horse Power Committee I cannot well imagine. The dots are literally all over the place, yet they are the record of observations from which the highly empirical formula proposed has been deduced.

There is an exceedingly simple formula which, under average conditions, is capable of holding its own with all the more complicated ones that have been put forward. By "average conditions" I mean within a fairly wide limit of engine speeds, for, if the engine is being overdriven it gives too high a result, but it does not seem to be limited to any particular range of dimensions, as far as engines have at present developed. It has been produced by several independent investigators, of whom I was not the first, though it is frequently associated with my name. I refer to $\frac{n\,s\,d^3\,v}{12{,}000}$ or $\frac{n\,s\,d^2\,v}{200{,}000{,}000}$, according to whether the dimensions are expressed in inches or millimeters. Here n is the number of cylinders, s the stroke, d the diameter, and v the number of revolutions per minute. It is derived from the "PLAN" of steam practice, and assumes the $\eta$ p, or effective mean pressure corresponding to the brake horsepower, to be 84 pounds per square inch. $\eta$ is a fraction representing the efficiency of the engine, and effects the change from i.h.p. to b.h.p. It may be objected that this assumption of the mean pressure is a large one to make, but the conditions are very different to the enormous range of pressures in steam engines of different kinds, and this is a fair average, and is, I think, fully justified by the results obtained. If the revolutions are unknown, and an idea of the power that would be obtained from a given engine on the road is sought for they may be assumed at 1,000, and the formula becomes $\frac{n\,s\,d}{12}$, or $\frac{n\,s\,d^2}{200{,}000}$. Strictly speaking this assumes that the product of $\eta$p and the number of revolutions is 84,034.

This expression is superior to that of the R. A. C. $\left[\frac{n\,d^2}{2.5}\right]$ because, although the latter is considered on the theoretical grounds by its supporters to take into consideration both stroke and m.e.p. the practical result of it is that two engines with the same diameter and different strokes are rated the same, which is absurd, more especially in these days when the tendency is to increase the length of the stroke.

The committee's formula is put forward as "the maximum practicable b.h.p., as determined by a bench test under onerous but safe conditions." I gather it is based on the figures given by Mr. G. A. Burls in the paper accompanying the report. Now, it so happens that in his tables we can see very nearly what is the maximum power that has been obtained from many of the engines. For shortness, I will call the committee's proposed formula—i.e., .45 (d + s) .(d — 1.18) N—A; Mr. Dugald Clerk's modification of this, in which he multiplies it for the first factor —B; and the n s d² formula I shall in future designate as C.

Take engine No. 1. It developed by test at a piston speed of 1,275 feet per minute, 37 horsepower; at 1,535 and at 1,705, 41.5. We may take it, therefore, that 41.5 is about the most that can be squeezed out of this engine. The power by formula A is 67.2; by B, 40.3. By C it is 39.6 at 1,275, and 47.7 at 1,535, at which point the engine was already being overdriven. In the case of No. 2 we have 21 horsepower at 937 r.p.m., and 22 both at 1,205 and 1,340. Hence 22 is not very far from the maximum.

Formula: A, 63; B, 38; C, 22.4 at 937 and 29.5 at 1,205.

No. 3 is a large six-cylinder racing engine, developing 104 horsepower, at 1,666 feet per minute, which is 2,000 revolutions. It is probable that this is not very much below the maximum.

Formula: A, 163.4; B, 98; C, 121.

No. 4 gave 45 horsepower at 1,082, and only 47 at 1,333, so it is clear little would be gained by driving this engine faster.

Formula: A, 103; B, 62; C (at 1,082), 48.4

No. 5 gave 32 at 1,166, and only 33 at 1,417.

Formula: A, 48.5; B, 29; C (at 1,166), 39.8.

No. 6 produced 54 horsepower, at 2,040, which is 2,300 revolutions, practically maximum.

Formula: A, 80; B, 48; C, 57.

In No. 14 we have an excellent indication of the maximum, as it gave 87 at 1,416 and 1,600, dropping to 86 at 1,665.

Formula: A, 155; B, 93; C (at 1,416), 95.

No. 15 gave 32 at 960 32.7 at 983, and 30 at 1,035. Here again the limit is clearly shown.

Formula: A, 90; B, 54; C (at 983), 35.5.

No. 16 gave 37 at 1,160, and 37.5 at 1,320.

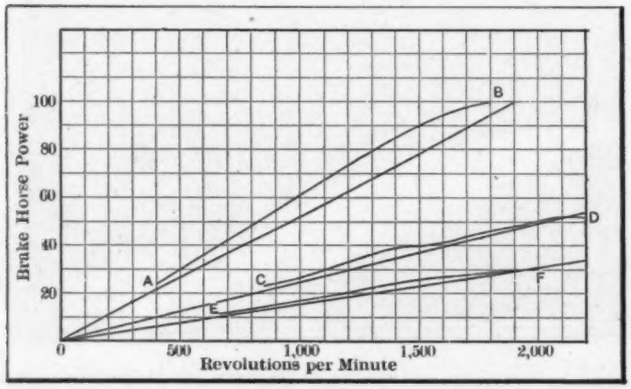



Fig. 1—Characteristic curves of three gasoline engines as compared with the proposed formula

Formula: A, 107; B, 64; C (at 1,160), 47.

No. 19 gave 202 at 933 and 204.5 at 955. Possibly this engine might have been pushed considerably higher, but I have worked it out because it is such an unusual size, namely, 12 inches diameter by 8 stroke.

Formula: A, 474; B, 285; C, 275.

No. 20 developed 108 at 1,120 and 109 at 1,200.

Formula: A, 264; B, 158.5; C (at 1,120), D, 143. The last two engines are both considerably below Formula C at all speeds. The cause is possibly bad cylinder proportions. In steam engines it has been found best for the stroke to exceed the bore, and I think the same holds good for these engines.

Nos. 27 and 28 are similar engines, except that one has four cylinders and the other six. It is a very remarkable thing that at five different speeds the powers should be *exactly* proportional to the number of cylinders. This is a case of practice agreeing almost too closely with theory, and one is inclined to suspect the accuracy of the tests, especially the last one, which is at 2,500 revolutions, when one would expect the six-cylinder to have rather the best of it. At this rate they are being driven to death, as No. 28 gave 47.2 at 2,000 revolutions, and only 41.2 at the higher rate of speed.

Formula: A, 87; B, 52.5; C (at 2,000 revolutions), 45.7.

No. 29 gives us a maximum also, as the power was 37.5 both at 1,580 and at 1,900 feet per minute.

Formula: A, 70; B, 42; C (at 1,580), 39.

The series 37 to 40 are extremely interesting, because they are engines with 1, 2, 4 and 6 cylinders all the same size. Here the figures are very close to the proportion of the number of units, without being absolutely correct. As they do not seem to have been driven up to their maximum power, I have not worked them out. In fact, I have done enough to show, from its own figures, that the formula proposed by the committee is of very little use for practical purposes. It is true, I have only taken some of the cases, but as I have simply chosen those which show clearly within small limits what is the maximum power that can be got out of the engines, there is no reason to suppose that those selected are specially unfair to the formula.

I give below four others, which are interesting engines, and show how extraordinarily well the n s $d^2$ formula adapts itself to widely different types.

I. Sunbeam car; 6 cylinders, 80 × 120 mm.; b.h.p. 46 at 2,000 revolutions.

Formula: A, 92; B, 55.2; C, 46.1.

II. Panhard motor for Lebaudy airship: 4 cylinders, 185 + 200 mm.: b.h.p. at 1,000 revolutions by test 128, by formula C, 136.9.

III. Gnome aeroplane engine; seven revolving air-cooled cylinders 4.3 by 4.7 inches; b.h.p. at 1,000 revolutions, 50 by test, 50.7 by formula C.

IV. Westinghouse motor for petrol-electric railway cars; 6 cylinders, 140 × 160 mm. At 950 revolutions, 90 by test, 89.4 by formula C.

The results of all the above figures seem to be that the Committee's formula for maximum horsepower more often than not works out at about double what can be obtained on test; that Mr. Clerk's modification, which is supposed to be the power usually to be expected on the road, gives somewhere about the real maximum, and that the one I have always advocated is slightly too much at high rates of revolution. The reason for this is not far to seek. When an engine is being tested at various speeds, after it has got into its stride, the horsepower rises steadily with the revolutions, until a critical speed is reached, after which it goes up more slowly, finally coming down again. Fig. 1 gives the characteristic curves of three petrol engines. The line AB is that of a six-cylinder Napier, cylinders 4 1-16 by 7 inches. By the committee's formula it should be capable of developing over 156 horsepower. CD is from a four-cylinder Sunbeam, 95 by 135 mm., and EF from a Crossley engine. The straight lines adjacent to the curves represent the n s $d^2$ formula for each engine. If it is desired to estimate the maximum power by this formula, and the revolutions are unknown, it can be done more or less accurately by assuming a number for them, based on experience, and the dimensions and design of the engine. Fig. 2 is a chart giving the horsepower by the n s $d^2$ formula.

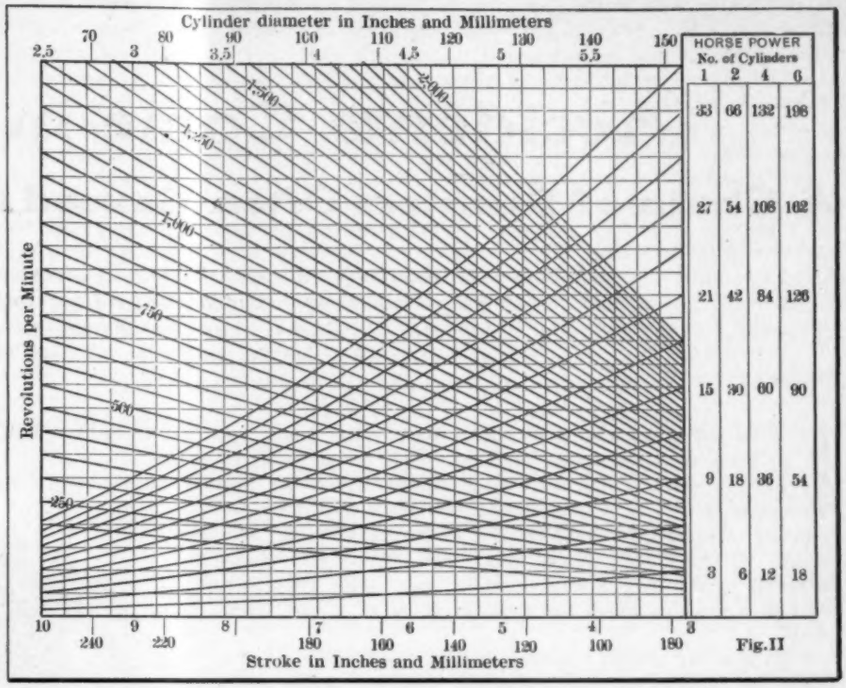



Fig. 2—Comprehensive chart showing the horsepower for various motors which can be read off at a glance, taking bare, stroke and engine revolution into consideration

This is used as follows: Enter at the bottom of the measurement for stroke, and run up until the correct revolution line is intercepted, then pass horizontally to the right and take the curved line which starts at the point of arrival. First, I will assume there is one just right. Go down it to the left until you are under the diameter on the top scale. The height of this point from the bottom gives the horsepower at the right side. If there is not a curve available, and it is necessary to interpolate, it is quite easy; you estimate the ratio in which the point arrived at divides the space between the two adjacent curves, then the required point below the diameter will occupy a similar position.

To take a practical example, the horsepower of the Sunbeam, my No. 1, is found as follows: Enter at 120 stroke and pass up until you intercept the 2,000 revolution line, then go across to the right. This lands you just about midway between two curves. Follow the curves back until immediately beneath the diameter, 80 mm., and take a point just below halfway between them, then run across to the right, where you arrive at 46 horsepower. It is worth pointing out that the exact equivalent for the constant 12 when millimeters are used is 196,634. The effect of taking the round number of 200,000 gives a result just under 1 3-4 per cent. lower, which is quite near enough for all practical purposes, a variation which, of course, is quite negligible, considering that an approximation is all that one can aim at in devising a formula.

# Accidents Come in Groups

## A Chain of Disasters Often Caused by a Single Mishap

*When the connecting rod cap bolts fail the damage is liable to involve many more parts than those originally affected. A small amount of play in this part of the motor will give rise to rapid wear, which will result at first in a knock and afterwards in disaster. Neglect may be dangerous and the knock should be eliminated as soon as it appears.*

IT is an old saying that misfortunes never come singly, and in many ways the saying has borne itself out in facts, but in such cases it may have been remarked that the misfortunes were to a large extent dependent upon each other and followed along in a natural sequence which could not be interrupted. A chain of accidents may hinge upon some peculiar condition caused by a derangement of one of the component parts of a machine which has been the result of a very trivial cause.

A glace at the broken crankcase in Fig. 1 will show to what extent the damage may be transformed from one which would be easy to repair to one which requires the replacement of several parts. The connecting rod cap is shown to be broken off and this is what caused the rest of the damage. After being freed from the crank bearing, the connecting rod knocked the piece from the side of the crankcase walls. Another case is shown in Fig. 2, where the connecting rod has been driven through the walls of the cylinder owing to a broken bearing cap.

The last-named accident happened to a car with a horizontal engine and is, of course, only to be repaired by buying a new part. In the former, where the connecting rod has pierced the walls of the crankcase the repair may be made by bolting a cover over the fracture and fitting a gasket so that the patch will be oil-tight. There is always a mist of oil present in the crankcase even if the lubrication system should not happen to be the splash method of lubricating, hence a gasket or some other form of packed joint should be used in placing the cover over the hole.

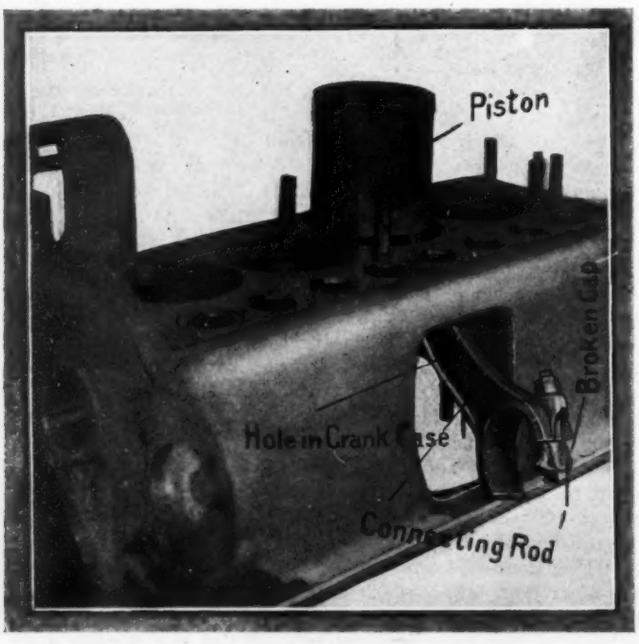



Fig. 1—A case where a broken cap bolt was responsible for further damage. The connecting rod has pierced the crankcase wall

In ordering a new part for a repair, such as the accident to the horizontal cylinder would necessitate, the piston should accompany the cylinder so that a proper fit is obtained. It will often be found, however, that the piston is sent, placed within the cylinder as shown in Fig. 3 (which is the new part to replace the broken one), and that some sort of lubricating matter has not been placed on the piston before it has been inserted. As a result, when the piston reaches the repairman he is unable to withdraw it. The illustration depicts a futile attempt which was made to withdraw the piston by placing a rope around the wrist pin and pulling thereon. The cylinder had to be soaked in kerosene for twenty-four hours and the piston hammered loose before it could be removed. It had rusted in the cylinder.

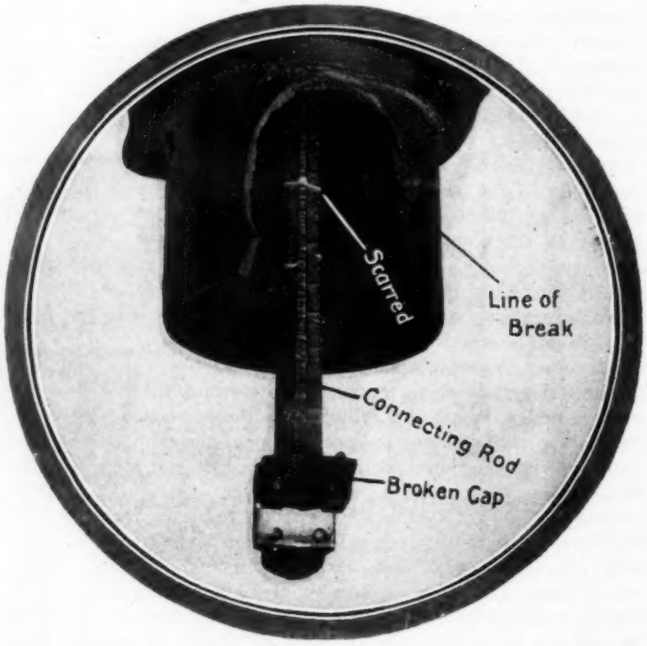



Fig. 2—Illustrating a broken cylinder which was caused by the failure of one of the connecting rod bolts. The following revolution of the crankshaft drove the connecting rod through the cylinder

Broken connecting rod caps, while not a common occurrence, generally cause much more damage than just that to themselves. As the connecting rod is released it will swing loosely as a pendulum from the wrist pin, the revolving crankshaft will come around and hit it a series of blows which will have sufficient force, as a rule, to send it through any metal which may be in the way, if the motor is not stopped in time to prevent several blows. Very often one revolution is enough to do the damage.

The connecting rods themselves are naturally very much

battered up after an experience of this sort, so that the list of articles requiring replacing will naturally include one of these. An inspection of the two illustrations which show the broken parts will give an idea of the grinding and twisting to which the connecting rods were submitted; they have resisted the force of the blows better than the brittle castings, which was to be expected, owing to the inherent difference of the qualities of the material. In fitting a new connecting rod great care must be observed that it is of the same length as the others for a slight difference in length will make an appreciable difference in the clearance volume, which will materially influence the amount of compression. Trouble of this nature will not, as a rule, annoy the purchaser of spare parts, as the product of the factory will be found to be so standardized that interchangeability will be a matter of course; still where several years have elapsed between the time of replacement and the model of the machine a comparison should be made before fitting.

The connecting rod bearing cap is generally fastened by means of two bolts which are placed in bosses one on either side of the crankpin bearing so that the piston may be conveniently

Fig. 3—Method used in an attempt to remove piston from cylinder. This means proved inadequate, as the piston had rusted within the cylinder

withdrawn as shown in Fig. 4. These two bolts are subjected during the power strokes of the motor to practically no stress at all since the rod is under compression and all strains are taken up by the crank bearing. There are certain parts of the stroke, however, where the connecting rod is in tension owing to its inertia, for instance, when after reaching the bottom of the power stroke the tendency of the connecting rod is to continue traveling in the same direction, it is checked by the upper part of the crank bearing which swings about and pushes the connecting rod and piston up into the cylinder. During all this time the rod is under compression and there is no strain on the bearing cap bolts, but when it has reached the top dead center an explosion takes place in another cylinder and pushes the crankshaft around. This will pull the connecting rod down and with it the piston which will put the rod in tension and place the strain on the cap. All the strain on the connecting rod caps is taken up by the two bolts when the rod is in tension.

The changes from compression to tension in the rod and hence in the rod attachments will be very sudden and it is evident that a very small amount of play in the bearing cap conection will cause rapid wear on account of the high inertia of the heavy moving parts, which, instead of being gradually reduced to zero as they would be in a case where there is no play, are brought to rest with a jerk which takes the effect of a hammer blow. It is impossible to bring a moving body instantaneously to rest. The lapse of time may be almost infinitesimal in the case of a light body moving at low speed, but the kinetic energy must have had time to dissipate itself either by being brought to rest slowly by the action of a contrary force or by impact with another body in which case there will be an elastic vibration set up which will consume some of the energy while the rest will be converted into heat. This latter is what takes place in a bearing in which there is excessive play and where the inertia forces are large, as they are in the case of the connecting rod bearing. The continuous impinging of one part against the other will cause a wear which will cause more lost motion as time goes on and will eventually develop a distinct knock in the motor. This is the danger signal and the wise motorist will heed it and search until he has found it.

Since the two bolts in the bearing cap take all the tension to which the connecting rod is submitted and are not subjected to any other appreciable stress it is evident that they should be large enough so that each be one-half as strong as the rod, plus a small additional factor of safety for wear.

Failure of the connecting rod is not very common for a variety of reasons, the greatest among them being that common practice has evolved a connecting rod which is somewhat heavier than actually required, and makers are not very anxious to tempt fate by cutting down weight in this part of the mechanism. All the force of the explosion is carried from the piston head to the wristpin and by means of the connecting rod to the crankshaft. When the ignition is early the strains endured are greatly augmented, especially if it is so early that a pounding results and places a severe compressive stress on the rod. If failure should occur, however, as is always possible, it would be in the nature of bending instead of crushing as is ordinarily assumed, since the connecting rod is a column.

It is very likely, as stated at the head of this article, that should the connecting rod fail, damage on a much more extensive scale than merely that to the original parts affected would be almost sure to result, but it nearly always starts in a small amount of play in some vital part and the careful man may save great expense by attending to the first small knock. The illustrations in Figs. 2 and 3 shown herewith are from photographs taken at R. M. Owen's repair shop, 1759 Broadway, New York City.

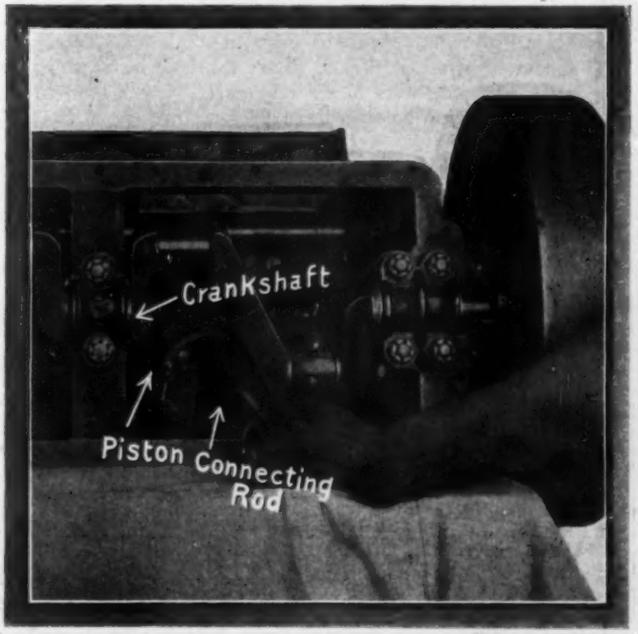



Fig. 4—The piston, connecting rod and attached parts may sometimes be withdrawn by removing the connecting rod bolts

# Convertible Body for Depot Work

## A Design Adapted for Suburban Use

*Besides the carrying of passengers there will be of necessity a great many pieces of baggage to be carried to and from the depot. The body shown and described herewith, designed by George J. Mercer, is intended to meet all the exigencies of suburban service, both as regards passengers and their luggage.*

THE requirements of a car which is designed to carry passengers to the railway depot in the morning from their places of residence and in the other direction in the evening, not to mention the various trips in either direction during the day with a stray passenger or two, are various. Such a vehicle must have room for trunks, as there is generally no express depot in the rural districts and all the hauling is done by the local liveryman. To maintain a horse service besides the automobile would greatly impair the efficiency of the scheme, as it would double the cost, while an all-horse outfit would be cheaper than the combination.

The problem could readily be solved, it is true, by maintaining two or three automobiles with different types of bodies, and that is what is generally done under the circumstances. This, of course, entails a large first cost and also an increased cost of upkeep and has been without doubt the cause of a great many suburban liverymen not having adopted the automobile service with its many advantages of speed and flexibility. To meet these requirements the convertible body has been suggested.

The body may be arranged in three different ways which are depicted in the accompanying illustrations. Fig. 1 shows the car arranged with two seats and a top which may be folded down at the convenience of the driver; when folded down as it is shown in the cut, the top takes up the position which is indicated by the dotted lines. When arranged in this manner the car is adapted to four passengers and the space at the rear will carry a small amount of luggage which will in quantity be more than the amount usually carried by four average passengers.

The next illustration, Fig. 2, shows the body arranged as a wagonette with side seats in the rear part of the wagon which are each capable of holding three persons, making a total of six passengers in the rear and two on the driver's seat, or eight altogether. A top which is provided with side curtains is fitted on this model so that in case of a storm they may be lowered and the passengers protected. A celluloid curtain protects the driver, so that in the way of protection in all kinds of weather, a point most necessary in this work, this car is amply protected.

The entrance to the rear part of the car is effected by means of a step which is lowered only when it is required. At other times it is kept folded against the rear of a tool box which is carried suspended beneath the car. The step is shown in dotted lines in its two positions in relation to the tail gate, which is also lowered when required and provides the landing step.

When used solely for trunk-carrying purposes the body is arranged on a purely wagon basis even so far as having side wings, as shown in Fig. 3, in case the packages are of great bulk or if there are a great many of them. The loading space back of the seat and inside the tailboard is 3 feet 10 inches long, and the wheelbase on the chassis is 114 inches in length. The chassis is of runabout type with the steering column sloped at 45 degrees and shortened so as to place the driving seat 24 inches from the dash.

There are a great many people who are located in various parts of the country at a distance of between twenty-five and seventy-five or even more miles from large cities who make their living during the Summer by carrying passengers to and from the railway station, besides having a contract with an express company to deliver all goods which are directed to houses within the district covered by the wagons. Outside of the actual passenger traffic there is the consequent baggage, which amounts to a large item since there are a number of transient visitors to these suburban places who stay perhaps over a short vacation period or merely for the week end. In a great many cases along the seashore the coast line is so irregular that the railroads do not attempt to follow along its deviations but content themselves with running their line about a mile inland so that they can operate with as few bends as possible. The people who live in the country districts will be found to greatly favor the vicinity of water. This is especially the case where the inhabitants are largely made up of those who live in town during the Winter and along the water front in the Summer. Owing to the irregular shore line there are many spots where the railroad is at a very great distance from the homes of the passengers.

The service given by the horse met the exigencies of a two-mile trip as well as could be possible, making the trip in fair time and being very reliable except in extraordinary cases. Above this distance, however, a trip to the depot became more or less of an ordeal for the commuter so

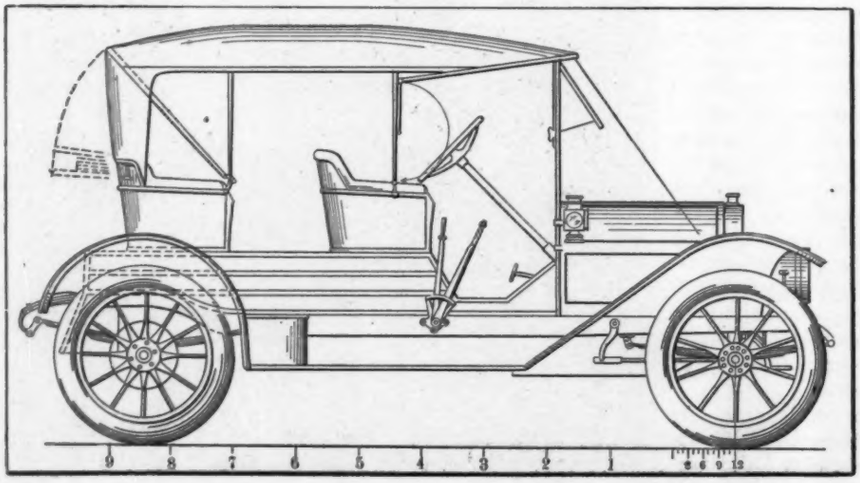



Fig. 1—Showing the convertible body as a two-seated passenger car

that he was prone to pick out a less favored spot in order to bring himself within such a distance of the depot that he may spend a fair part of the evening in sleep instead of making a hurried rush in the early dawn for a train that will take him to town in time for the opening of the business day. The coming of the automobile has gone far to revolutionize these conditions and a trip of even five miles has no terrors for those who are in reach of its services. In a great many cases the Summer visitors have their own cars, but on the average there is a very large number who are not so provided and who would appreciate an up-to-date liveryman who would provide the rapid service which is possible with an automobile. To maintain a service which would take care of both passengers and baggage it is necessary as a rule that vehicles of large capacity be used. This will depend, however, on the demands due to the size of the population.

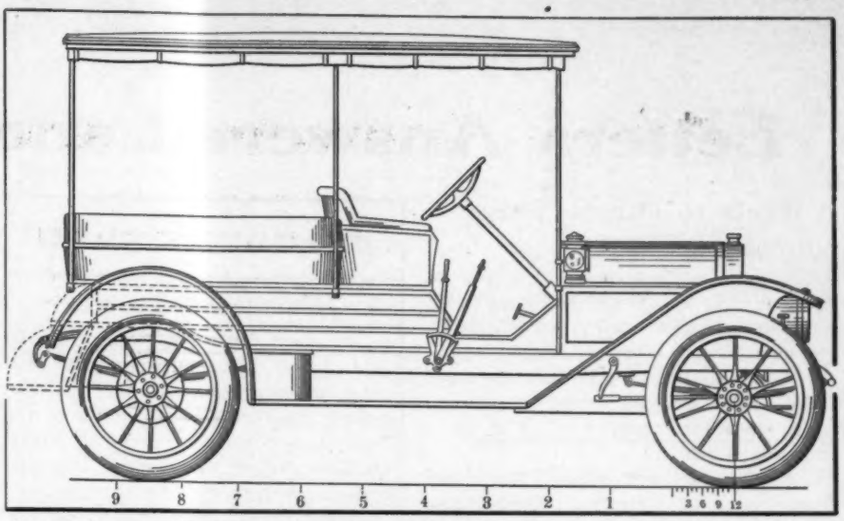



Fig. 2—The convertible body is shown as a wagonette, with space for six passengers in the rear and two in the driver's seat

From this description and the illustrations which accompany it it is evident that it is possible to have a convertible body for this type of work which, besides possessing ability, will present a neat appearance.

## Gas Generator Needs Care

*The parts of the gas generator which are located in such a position that they are apt to be subject to lime deposits need constant care so that their action is not prevented by the subsequent clogging. Occasional attention will go far toward prolonging the life of the generator.*

THE parts of the carbide carrier which come in contact with the water distribution apparatus are liable to clogging by the formation of lime residue in the generation of gas. If this residue is allowed to collect, it will have to be removed with a chisel, which is a delicate operation in a light construction like that of a generator, especially around the water valve or its outlet. Acids are sometimes used to remove the deposit, but as they eat the metal, their use should be prohibited. The basket and pot should be thoroughly washed out after each run with water, the water outlets being cleaned with special brushes, when these are obtainable, or by wires, removing all traces of lime. The water valve should be scraped and tested to see whether it seats properly, care being taken not to damage the valve or its seat in so doing. While the valve is dismounted for cleaning it would be well to see that its stem is straight and that it works with some ease in the threaded portion attached to the water chamber. The gas valves should be cleaned and should seat snugly, so that there will be no leakage past them. This applies also to the gas valves on the lamps. It must be remembered that the best polish on the outside of the brass work has nothing to do with the condition of the interior.

The best position for the generator is on the running board just back of the change gear quadrant, and sufficiently far out from the frame to allow a free circulation of air all around it. The generator will keep cool in this position and will perform its work to the best advantage when properly cooled.

ENGLISH TAXI CHAUFFEURS NOT WORKMEN—A bill recently introduced into the House of Commons has to do with a recent decision of the House of Lords, to the end that taxicab drivers are not entitled to the benefits of the Workmen's Compensation Act, 1906, on the ground that they are not "workmen" in the legal sense of the word. The bill is intended to reverse the decision.

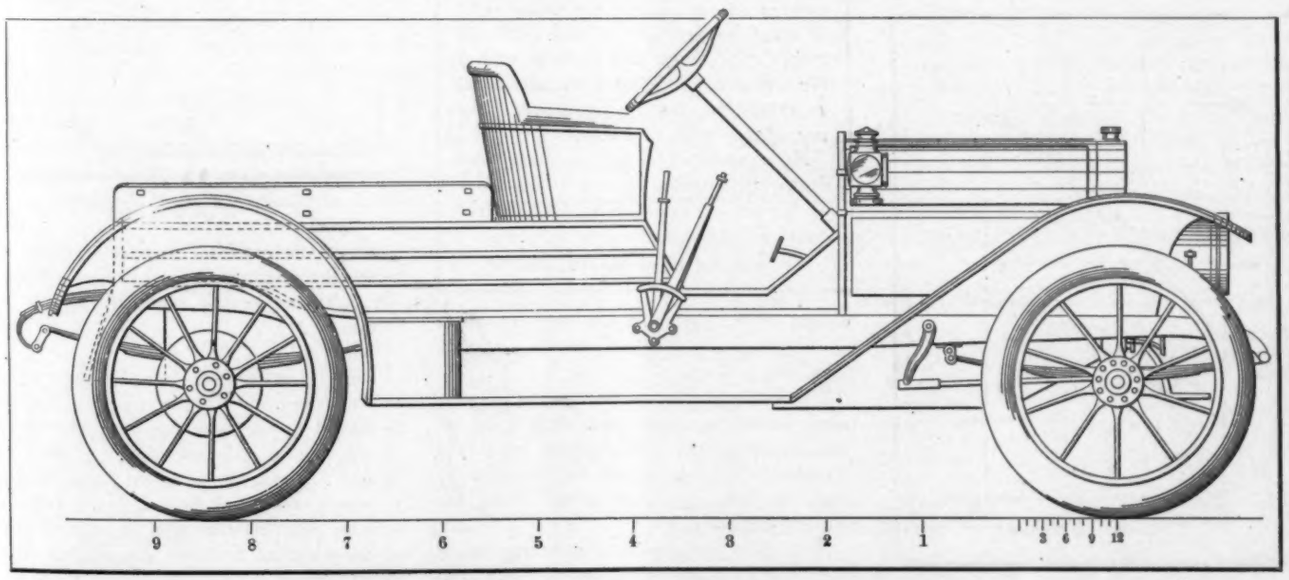



Fig. 3—Illustrating the convertible body as a trunk-carrying vehicle

# Letters Answered and Discussed

## Wants to Darken Brass

EDITOR THE AUTOMOBILE:

[2,797]—Some weeks ago I saw a statement that olive oil added to some other ingredients and applied to brass would darken same and hence relieve one of the necessity of polishing it. I have lost the copy of the receipt and am asking you therefore to repeat the receipt. J. M. D.

Bowling Green, Ky.

A receipt published recently in these columns was as follows: Dissolve 100 parts of copper nitrate in from 100 to 200 parts of water; it is possible to form a solution in which the parts may be immersed or if too large the solution may be painted thereon. Then drain or shake off the surplus solution and heat the article so as to decompose the copper salt into a black copper oxide. The heating can be carried on over a clear charcoal fire or in a closed muffle furnace.

## Small Cylinder Design

Editor THE AUTOMOBILE:

[2,798]—Could you tell me through your letter department how to figure the amount of iron in the cylinder of a four-cycle, single-cylinder, air-cooled motor of motorcycle type? What is the thickness of the cylinder at the combustion chamber and at the side walls? Give formula for calculating the size of the connecting rod and piston of a motor 3 3-4 x 4 inches and tell me what are generally the length and thickness of the flanges? How is the cylinder fastened to the crankcase and what is the formula for determining the size and weight of the piston for this size of motor?

H. E. RIEGEL.

St. Paul, Minn.

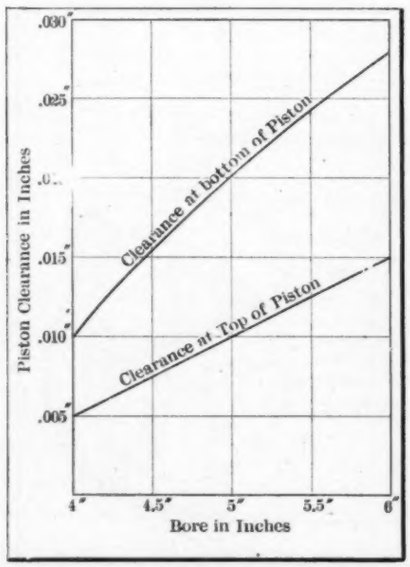



Fig. 1—Curves of piston clearance, showing the correct amount at top and bottom

A cylinder of the size mentioned in your letter would be about three-eighths of an inch in thickness. The cylinder head in a cylinder of this size would be cast with the walls in one piece and would be of the same thickness.

If a plain rectangular connecting rod is used the average thickness of the rod would be: $t_r = .008d\sqrt{P_m}$, where $P_m$ is the maximum pressure on the rod and D is the cylinder diameter. The cylinder is fastened to the crankcase by flanges and bolted, the joints either being provided with a paper gasket or ground. For an engine of this size the width of the holding flanges would be 2 1-2 inches and three-eighths of an inch thick. The piston length is 1.2 d, where d is the cylinder diameter. The maximum pressure on the piston head would not exceed 240 pounds to the square inch. The formula for the thickness of the piston head would be: $T = r\sqrt{\frac{5}{6} \cdot \frac{P_m}{F}}$ for flat heads, where $r$ is the active radius in inches, T the thickness in inches, $P_m$ the maximum pressure in pounds to the square inch and F is the working stress in the metal and can be taken as 4,200 pounds per square inch.

The weight may be found by estimating the material in the piston and multiplying it by the weight of cast iron which is .260 pounds per cubic inch.

## Announcement

### *MY 1912 AUTOMOBILE*

*So much interest is being taken in the coming 1912 models that criticisms are already being heard to the effect that the 1912 automobile is not meeting the expectations of many readers of* THE AUTOMOBILE. *In order to discover exactly what are the conceptions of the many readers on the 1912 machines* THE AUTOMOBILE *started last week a discussion on the 1912 models and hereby invites every reader to mail in what are his or her conceptions of next year's car. The information given should include such points as:*

| | |
|---|---|
| *Horsepower* | *Tire sizes* |
| *Bore* | *Rear axle* |
| *Stroke* | *Front axle* |
| *Ignition* | *Control parts* |
| *Lubrication* | *Body features* |
| *Carburetion* | *Equipment* |
| *Clutch* | *Cylinder type* |
| *Gearset* | *No. of cylinders* |
| *Drive* | *Cylinders, how cast* |
| *Springs* | *Price* |
| *Wheelbase* | |

*In addition to giving these details the reasons for your points of selection should be stated concisely and clearly.*

*As a benefit in the matter of comparison some details of the average cars for 1911 are given herewith, these details being for cars selling at $1,000 or thereabouts; $1,500 or thereabouts; $2,500 or therabouts, and $4,000, thereabouts and up.*

*Each communication must be legibly written on one side of the paper only; it must be properly signed with the writer's full name and address, and if the writer does not wish his own name to appear in print he may request the use of any nom de plume.*

*Any reader desiring to make line drawings, showing details of his ideas of his car or some of its parts, is requested to do so.*

*Editor* THE AUTOMOBILE.

## Proper Piston Clearance

Editor THE AUTOMOBILE:

[2,799]—I am desirous of having a new cylinder made for my car which is not being made any longer the manufacturers having given up the business, I would like to know the correct clearance to allow between the piston and the cylinder. Should the clearance be the same at the top and bottom? A. F. D.

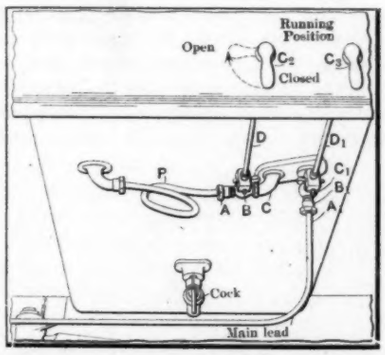



Fig. 2—Illustrating the fittings placed under a gasoline tank

Pekin, Ill.

The clearance should be different at the top and bottom of the piston. As you neglected to mention the bore and stroke of the engine it is impossible to give you figures. A diagram is given herewith, Fig. 1, which will, it is hoped, prove satisfactory in your case as well as in any other of the kind, as it shows the correct clearance for an engine of any bore up to 6 inches.

## Wants Varied Information

Editor THE AUTOMOBILE:

[2,800]—Being a subscriber to your valued paper, I would like to ask the following questions:

(1) In a motor of 70 pounds compression, assuming that combustion is perfect, what is the temperature of the mixture at the instant of explosion?

(2) What is meant when a motor is said to have a compression of 50 pounds absolute?

(3) What would be the temperature of a perfect mixture of gasoline and air burned under a pressure of 110 pounds per square inch?

(4) Assuming conditions of question 3, what would be the temperature of kerosene and air?

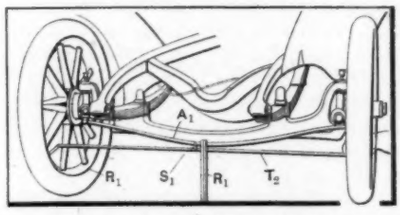



Fig. 3—Illustrating method of determining parallelism of the wheels

(5) What is the chemical composition of kerosene?

(6) In your article on cooling and efficiency in issue of August 3 you mention a two-cycle engine. Could you explain the operation of this motor? G. W. R.

South Auburn, Neb.

(1) Since the specific heat of gases varies as the temperature increases it is not possible to accurately determine the temperature of combustion in the cylinder on this basis even though the calorific value of the fuel be known.

(2) Absolute pressure is pressure above zero, while gauge pressure is that above atmosphere.

(3) and (4) are answered under (1).

(5) Kerosene is a mixture of hydrocarbons chiefly of the methane series. Methane gases are of the form of $C_nH_{2n+2}$ as $C_4H_{10}$.

(6) We have no full description on hand at present of the motor to which you refer.

## Wheels Not Parallel

Editor THE AUTOMOBILE:

[2,801]—Would you kindly tell me a method of testing the wheels of a car to determine whether they are parallel? The front tires on my car wear at such a rapid rate that I am inclined to believe there is something wrong in their alignment. M. G. H.

Albany, N. Y.

The accompanying sketch, Fig. 3, will give a method of testing the wheels. A tubular pointer $T_2$ with an indicator on either end is used. This pointer consists of two parts, one smaller than the other, so that it may be slid inside and held in any position by the lock nut in the center $S_1$. A rule R is set up, and the height measured along the tube so that it is parallel. The tube is held in position and is adjusted so that it is parallel to the ground. The method of determinirig the parallelism is to find the distance between the outer edges of the rim at the front at a given height say 10 inches from the ground and after locking the gauge the same should be placed at the rim at the rear of the wheel at the same height as at the front. There should be a slight toeing in towards the front dependant upon the size of the wheel.

## Lifting a Motor

Editor THE AUTOMOBILE:

[2,802]—I have a small garage where I do a great deal of repair work on all types of engines. Would you kindly describe a rig for lifting all types of motors? L. K. L.

Trenton, N. J.

A block and fall could be set on the overhead beams from which an arrangement consisting of a center bar with four drop arms as shown in Fig. 4 which can be used on any type of motor to either lift it out of the chassis or hold it suspended while work is being done.

## Condemns Improper Material

Editor THE AUTOMOBILE:

[2,803]—The following analyses of a gear wheel which was put into a car now listed for $1,700 may be of interest to your readers as an example of what *not* to buy for this purpose:

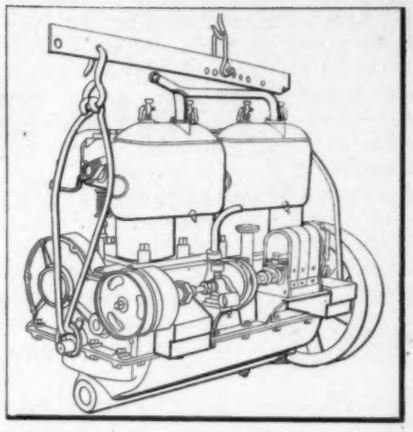


Fig. 4—Showing a device for lifting the motor from the frame and carrying it to another part of the shop

Sulphur, 0.056 per cent.
Phosphorus, 0.115 per cent.
Manganese, 0.56 per cent.
Carbon, 0.12 per cent.
Oxides and slag, 0.65 per cent.

This is evidently a poor grade of soft Bessemer steel and was case-hardened. The steel was so laminated as to look at first glance like a poor grade of wrought iron. The gear teeth broke, causing considerable damage. The ignorance or carelessness of anyone using steel like this is hard to understand. F. N. SPELLER.

Pittsburgh, Pa.

## Gasoline Tank Piping

Editor THE AUTOMOBILE:

[2,804]—Would you kindly tell me what pipe fittings it is necessary to buy in installing a gasoline tank for an automobile. I intend to do the work myself and would appreciate any help. J. E. S.

The accompanying Fig. 2 will show a tank tilted which can be made with two compartments, be placed in communication by the pipe P1 and the lever C2 which operates the cock B. The lever C3 placed alongside the lever C2 controls the main flow and should be down when open.

*DETAILS OF AVERAGE 1911 CARS WHICH WILL ENABLE READERS TO MAKE COMPARISONS IN DISCUSSING 1912 MODELS*

| | $1,000 and thereabouts | $1,500 and thereabouts | $2,500 and thereabouts | $4,000 and thereabouts |
|---|---|---|---|---|
| *Horsepower* | 20.5 | 29.525 | 35 | 43.66 |
| *Bore* | 3.98 *inches* | 4.19 *inches* | 4.40 *inches* | 4.875 *inches* |
| *Stroke* | 4.12 *inches* | 4.64 *inches* | 4.98 *inches* | 5.39 *inches* |
| *Wheelbase* | 100 *inches* | 114 *inches* | 119 *inches* | 124 *inches* |
| *Front tires* | 31.4 *x* 3.3 | 33.1 *x* 3.8 | 35 *x* 4 | 35.7 *x* 4.27 |
| *Rear tires* | 31.4 *x* 3.3 | 33.1 *x* 3.8 | 35 *x* 4.1 | 36.7 *x* 4.55 |
| *Number of cylinders* | *Four* | *Four* | *Four* | *Four* |
| *Cylinder type* | *L-Head* | *L-Head* | *L-Head* | *T-Head* |
| *Cylinders cast* | *Pairs* | *Pairs* | *Pairs* | *Pairs* |
| *Ignition* | *Dual* | *Dual* | *Dual* | *Dual* |
| *Clutch* | *Disc* | *Multiple disc* | *Cone* | *Multiple disc* |

# Little Bits of Motor Wisdom

## Pertinent Pointers for Repairman and Driver

*A series of short stories that will tend to keep the automobilist in touch with matters mechanical and otherwise, covering a field of information that although usually well tilled, needs frequent and careful cultivation to produce the greatest results.*

ATTENTION SHOULD BE PAID TO BRAKE SHOES—Very often the cause of a mysterious rattle will be located in the brake shoes which have worked loose owing to an irregular wear, which has set up unbalanced strains in the drum and given rise to the chatter which is peculiar to this trouble. There are generally two complete sets of brakes carried in the later models of nearly all cars. An illustration of the way these two sets are set up on a single drum is given in Fig. 1, in which a set of expanding and contracting brakes is shown. The contracting or band brake is operated by the bell-crank lever which tightens the band so that a braking effect is attained around a large part of the periphery of the drum. In the internal expanding brake, in a hollow drum which is continually revolving with the wheel or some other revolving part of the car's mechanism there are two metallic shoes which are capable of being pressed firmly against the inner surface of the drum by means of a cam or toggle joint. The advantages of the latter type of brake are that it is less liable to remain set against the drum after the operator's pedal or lever has been released. It is also very easily adapted to either a forward or reverse motion of the wheels and will give a greater braking effect for a given pressure on the braking mechanism. One of the greatest of all its advantages however, is the fact that it can readily be made mud or grit-tight and prevents the parts from rusting.

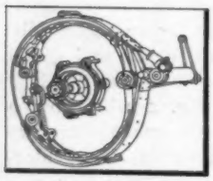


Fig. 1—Form of internal and external brakes used on modern cars

Besides metal to metal contacts the shoes are sometimes covered with an asbestos woven fabric riveted to the surfaces and known as a liner. These liners are readily removable and are less likely to burn out than the metal to metal type. The shoes are sometimes fitted with cork inserts which increase the coefficient of friction and thereby the braking powers.

To provide a surface which will stand both the heat and the wear has been the ambition of those interested in the manufacture of brakes and they have developed a form of reinforced asbestos.

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FILLED THROUGH SUPPORTING ARM—A practice which has been affected by various people is to have the crankcase oil filler hole placed in the supporting arm. In this way a large opening may be had, a feature which the breather pipes very often lack. In case the filler opening on the car is smaller than desired by the owner and he finds it impossible to fill the crankcase without great waste and consequent uncleanliness it is often possible to have an opening placed as shown in Fig. 2.

Fig. 2—Position of filler hole when placed in the crankcase supporting arm

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THE PRIMING CUP HAS ITS USES—A fitting which is placed on the top of the cylinder and which has a variety of uses is the priming cup. They are made in divers styles and sizes with a standard pipe thread by which they are connected to the cylinder. The type illustrated in Fig. 3, with a small cup on the top of the compression cock, is very satisfactory, especially since it is protected well against leakage by means of a spring which holds the valve plug in place. When starting the car after it has been cold for a length of time it may sometimes be found necessary to prime the motor. The small cup on the top of the cock forms a measure which can be filled while the cock is closed. The valve is opened by lifting the handle so that it stands upright. The cock will not jar loose while the car is running as the handle is weighted, so that the tendency will be that the handle becomes tighter as the jar continues.

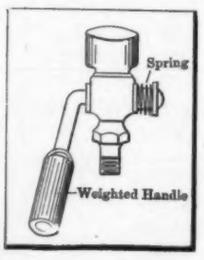


Fig. 3—Compression cock and priming cock combined in which a spring and weighted handle tend to keep the valve tight under all conditions

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SPLASH SYSTEM MUST BE WELL DESIGNED—In arranging a splash system it must not be assumed that the car is always going to run on level ground. The oil, like all other fluids, has a great aptitude of flowing down hill so that when the oil pan is tilted, unless there is some arrangement to hold the oil in position, it will all collect at one end of the crank case and while the cylinders at that end will be fairly drowned in oil the others will suffer a great want of the same important liquid. Fig 4 shows a longitudinal section through a crankcase in which the splash system of oiling is used. It is easily seen that if some means of prevention is not incorporated in the system the oil will run to one end of the crankcase and collect there until the small drainage pipes can drain it off into the reservoir below. In Fig. 5, the narrow splash trough which is often used as a means of overcoming the tendency is shown, the object being, as the diagrams show, to keep the oil in such a position that the connecting rod cap will reach it at whatever level the car happens to be running at the time.

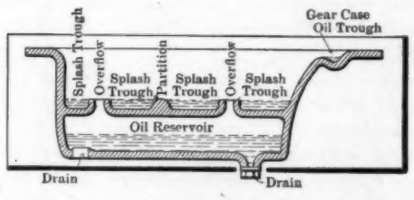


Fig. 4—Longitudinal section through a crankcase in which the splash system is used

Another means adopted in a large number of cars which are lubricated by the splash system is to incorporate a number of slanting troughs along the walls of the splash chambers. These troughs are so arranged that the oil is continually being thrown into them by the connecting rods. They lead the oil back to the next trough where it is picked

up and thrown into the trough which carries the oil back into the next chamber and so on until it has reached the last of the series, whereupon the oil is caught in a duct which leads it back to the first trough. The leads on the walls are sloped so severely that it would be impossible for the oil to be led back in the opposite direction on account of descending any hill no matter how steep the same may be. Besides the set of troughs in the walls there are also a series of overflows which take the oil back to the reservoir which is located in the lower part of the crankcase below the tray which carries the splash troughs. These overflows are necessary since the supply of oil is continually being augmented by that which is forced into the oil pan by the pump.

Another method of keeping the oil from collecting in any particular section of the crankcase where the splash system is used is the simple one of providing very large overflow holes and a rapid circulation. If the overflow holes were large without the rapid circulation the oil would overflow down into the reservoir and would not be replaced rapidly enough to fill all the splash troughs. With a rapid circulation the oil is either generally led into the foremost compartment and then allowed to find its way back over the walls into each successive trough, or it is led into each separate trough by tapping for leads into the main oil carrier pipe which will run the entire length of the crankcase.

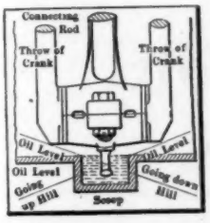

Fig. 5—Small splash trough. This cut shows the influence of road level on the oil in the trough

The greatest care will be necessary in not having a flooded condition of one part of the crankcase when the system is not circulating but the oil is carried in a separate tank which is just drawn upon sufficiently to replace the oil which has been used. In this case the system is generally a combination of both the force feed and splash systems, the oil being led to the main bearings and allowed to lubricate these copiously before flowing into the crankcase to form the splash system. The partitions between the different troughs in this case are most often pierced by a small hole which will keep a constant level under general conditions and which, in case of a hill, will not allow the oil to flow from one compartment to the other rapidly enough to cause smoking trouble.

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LEVERS ARE OF DIFFERENT TYPES—It has been said, with more or less truth, that every mechanical device can be resolved down so that in its primitive or elemental form it will be some variation of the lever or inclined plane. The ordinary wheel in spite of its dissimilarity to the common or garden variety of crowbar is still nothing more or less than a series of these bars which in this case go by the name of spokes; bound together by a rim. The fulcrum in this case being the road, the weight is applied at the axle and the power at various places according to the manner of drive and purpose for which the vehicle is intended.

In any lever there are several things which determine the class to which it belongs; they are the position of the fulcrum or point about which the weight is rotated, the location of the weight and the power which moves it as well as the relative positions of all three. There are three different classes of lever which are generally called first, second and third. The first class, shown in Fig. 6, has the fulcrum between the weight and the power, the second, Fig. 7, has the weight between the power and the fulcrum, while the third, Fig. 8, is that in which the power is applied between the fulcrum and the weight.

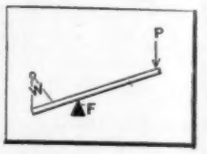

Fig. 6—Illustrating a lever of the first class

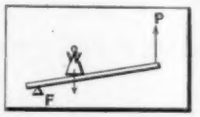

Fig. 7—Typical lever of the second class

The primary and most important purpose of the lever was to apply a greater lifting force to a body than was exerted by the operator of the appliance. It is not to be supposed that there was any gain in total energy, as that would be impossible, but where the gain was made in force applied there was a loss in space traversed, so that aside from the losses by friction in the bearing the number of foot-pounds applied on the power end of the lever is equal to that applied on the weight end. Secondary uses of the lever have been to reduce motion or to change its direction.

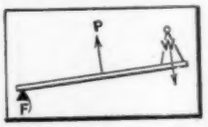

Fig. 8—Lever of the third class, showing relative position of power and weight

The bell crank lever is used in an almost countless number of ways and combines the purpose of changing the direction of the force with that of reducing the motion. It is in general a lever of the first class as may be seen from Fig. 9, which shows the most common form of this useful device. Referring to this figure, if a force P is applied at one end of the lever in a direction as shown by the arrow which passes through the point of application, and it is desired to convert this force into a force P′ acting in the direction indicated by the arrow passing through the other point of application as shown, the two forces will vary inversely as the perpendicular distances between the fulcrum and their line of direction, so that P : P′ : : b : a.

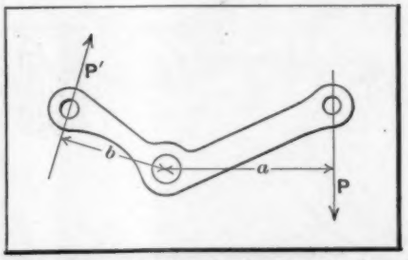

Fig. 9—Bell crank lever showing the direction of the forces P and P′ and their respective lever arms, a and b

In this way any desired reduction or change in direction may be effected. The amount of force necessary to lift a given weight in any lever, irrespective of the class to which it belongs, may be found by this proportion, which well illustrates the well-known fact that the longer the lever the greater the force which can be exerted on the weight, provided that the weight is relatively near to the fulcrum.

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A WELL-KNOWN KINK—Apropos of the subject of levers and the great gain in applied force by the use of a long arm, the well-known kink of increasing the turning power of wrench by slipping a piece of pipe over it may naturally occur to one. In a small bolt where this principle is employed care should be taken that the nut is not stripped by a too violent pull on the part of an over-enthusiastic operator. The accompanying sketch, Fig. 10, gives an idea of the relative length of pipe to spanner for very effective work.

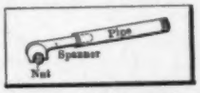

Fig. 10—Placing a pipe over a spanner to obtain greater turning moment

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WHEN GRAVITY FEED IS USED—In case of a pipe leak of gasoline, which has to be repaired on the road, it is a very uncomfortable feeling which creeps over the driver who has no means of shutting off the gasoline near the tank. A valve should be inserted in the very beginning of the line from tank to carbureter bowl and may be located as shown in Fig. 11. If this valve is inserted at the end of the tank it affords an excellent opportunity to place a screen over the opening so that there is plenty of precaution against foreign matter which might have found its way past the filler opening, especially since there are many drivers who regard the straining of gasoline as it is placed into the tank as a waste of valuable time.

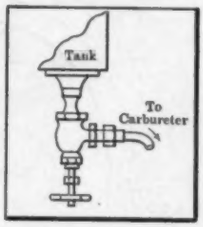

Fig. 11 — Position of valve below gasoline tank.

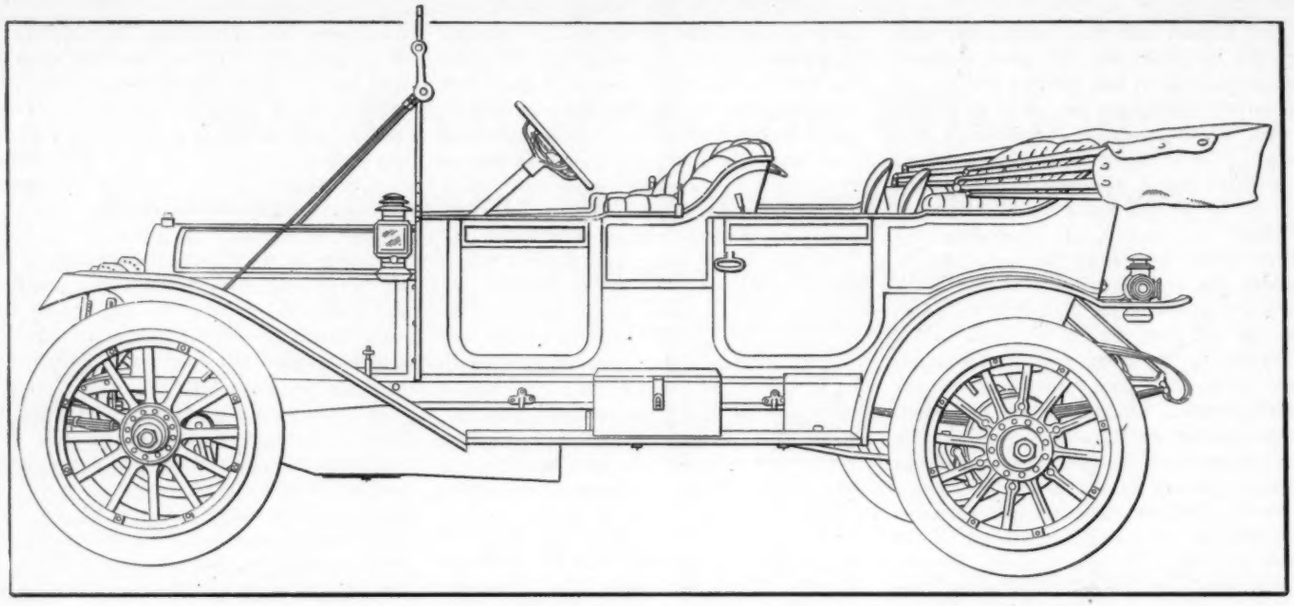

Fig. 1—Side view of the 40-horsepower, seven-passenger, fore-door Corbin touring car, presenting general appearance

# Pertinent Details of the Corbin

## Characterized by Insignificant Changes

*Whether the automobile has arrived at any degree of finality is a matter that will be left to historians at some later date; but an outstanding feature in the coming season's model of quite a large proportion of the manufacturers of this country shows a decided trend to adhere to the general scheme adopted last year, with whatever improvements and alterations that may have been found necessary or desirable in the light of the year's experience.*

THE preceding remarks may be applied to the product of the Corbin Motor Vehicle Corporation, of New Britain, Conn., manufacturers of the Corbin car. This concern is offering to buyers two models of 40 and 30 horsepower respectively, with six styles of bodywork. In order to differentiate between the two models it is proposed to handle each one separately, so as not to confuse the buyer.

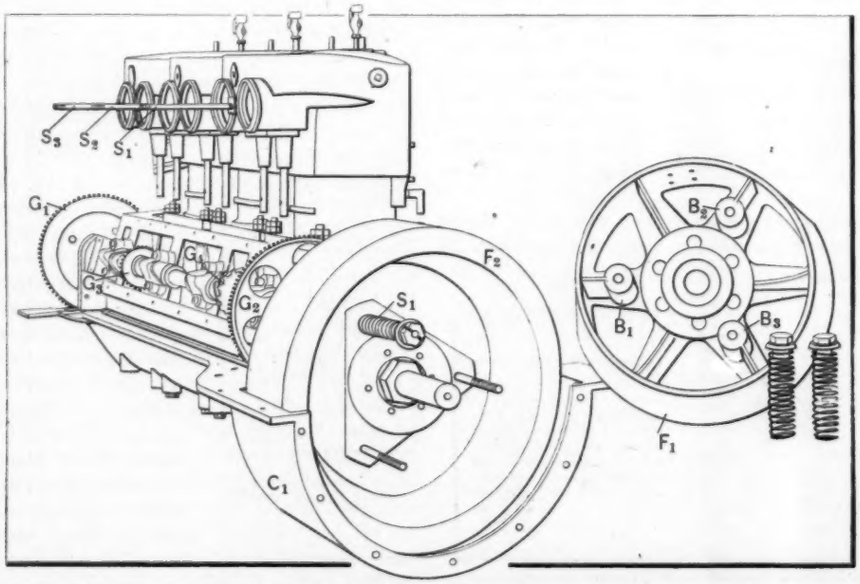


Fig. 2—Showing the 30-horsepower Corbin motor, with the clutch disassembled and valve gear cover removed

The 40-horsepower model has a four-cylinder motor, with the cylinders cast in pairs, having a bore of 4.75 inches and a piston travel of 5.5 inches. The cylinders are cast from a special gray iron, with integral waterjackets, and are afterward carefully ground to size. The valves are nickel steel, 2.5 inches in diameter, and as the cylinders have T-heads, the former being placed on opposite sides of the motor. The pistons are gray iron and are 6.25 inches long. A large oil groove is machined on the wrist pins, which are made from alloy steel, hardened and ground, being 1.25 inches in diameter. The upper ends of the connecting rods are clamped to the wristpins which oscillate in the piston bosses. The pistons are fitted with four eccentric rings, 1-4 inch wide and provided with diagonal-cut slots. The connecting rods are drop-forgings, of I-section, the big-end bearings being 3.5 inches long.

Fig. 3 shows the lower half of the base chamber with the bottom cover removed, from which can be seen the method of supporting the crankshaft. Three main bear-

ings are employed, the journals of which are 2 inches in diameter, and all bearings are finished by grinding. Front and center boxes C and C2 are 3.5 inches long, while the bearing next to the flywheel is 4.5 inches in length. The crankshaft is an alloy-steel forging with an offset from the perpendicular axis of the cylinders of 1 inch, in order to reduce the angularity of the connecting rods, thereby decreasing the piston thrust on the cylinder walls. The camshaft of the 40-horsepower motor is 15-16 inch in diameter, and runs on three bronze bearings, the front being 3.25 inches long at the point where the strain is greatest, due to the gearing, the center and rear bushings being 2.25 and 2.5 inches in length respectively. The method of driving the camshaft can be seen by referring to Fig. 3, but in this illustration the camshafts, together with their gears, have been removed. The gears utilized for driving the camshafts, pump and magneto shafts are cut with helical teeth from steel blanks.

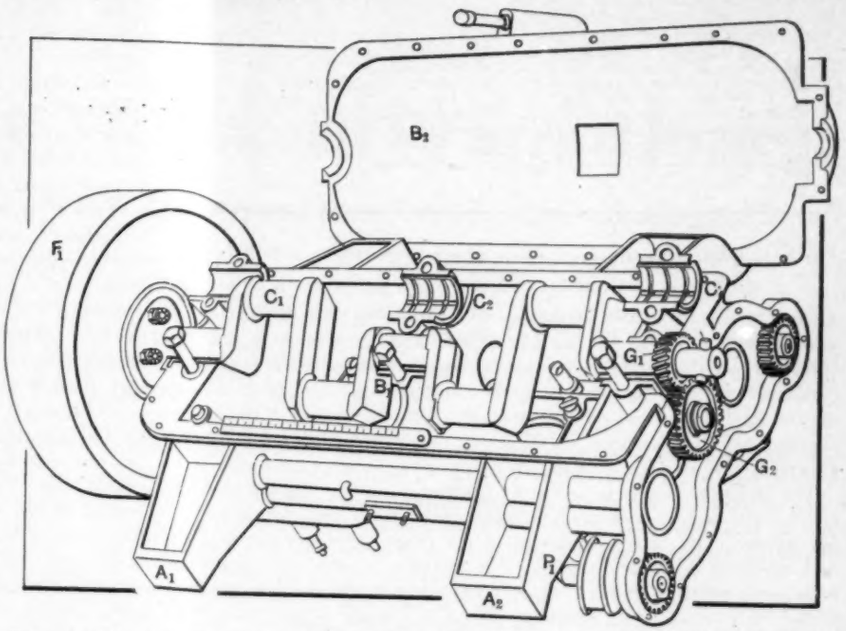


Fig. 3—Looking into the crankcase of the "40" model, with the lower half of the case removed, illustrating crankshaft construction and bearings

Fig. 3 shows the method employed of supporting the motor by four arms cast integral with the top half of the crankcase. The lower half of the crankcase can be removed without disturbing the crankshaft bearings and forms a container for the lubricating oil. The oiling system is of the constant circulation type, the lubricant being kept in motion by a gear pump, driven by bevel gears from the exhaust camshaft. A conduit is cored in the sidewall of the upper half of the crankcase, which forms the supply for the main bearings. The surplus oil reaches the crankpins through passageways in the shaft, while a spray or mist thrown by the rapidly revolving crankshaft lubricates the cylinders and other internal parts. It will be noticed that in the base B2 of Fig. 3 there is a square hole, through which the excess oil drains to the lower sump, no lubricant remaining in the case for the connecting rods to dip into.

The motor is cooled by means of a water-circulation system, employing a gear pump driven direct by an intermediary gear wheel off the halftime shaft. The water leaves the bottom of a honeycomb-type radiator and is forced by the pump to the water spaces surrounding the exhaust valve cages, and thence through the water spaces around the cylinders. The manifolds are well proportioned, the rear portion of the outlet pipe having a bore of 1.125 inches. The cylinder heads have a one-piece cover, secured in position by means of suitable packing and eight studs, and from each of these is led a single pipe. The size of the return flow pipe at the point where the front cylinders discharge their water is increased to 1.5 inches to compensate for the increased flow of water. The manifolds are of brazed construction, of copper piping, and the unions are either ground or fitted with packing flanges. The pump shaft bearing, which carries the stuffing box at the outer end, is 4 inches long, and interposed between the gearing and the pump, attached to the extension of the shaft there is a pulley which serves to drive the six-bladed fan which is mounted on a sliding bracket, driven through the instrumentality of a 1-inch wide, endless, flat belt, the tension of which is maintained uniform at all times.

The ignition is furnished by a U. & H. magneto which rests upon the front supporting arm of the motor, on the intake side. An entirely independent and supplementary ignition is fur-

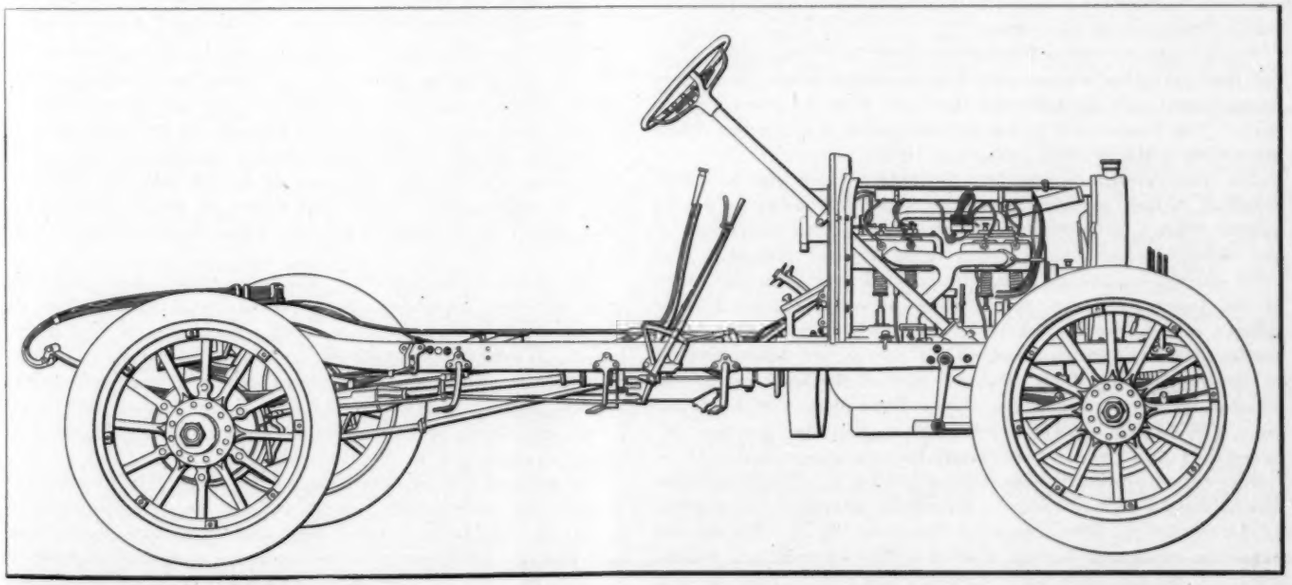

Fig. 4—Chassis of the 40-horsepower Corbin, showing the intake side of motor, steering equipment and substantial design of transmission and suspension

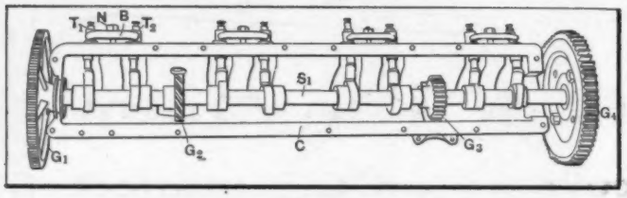


Fig. 5—Camshaft assembly of the 30-horsepower Corbin motor, illustrating the manner of actuating the valves

nished by means of a distributor, in conjunction with batteries and a single-unit coil. The distributor is located between the cylinders on the intake side and is driven by a vertical shaft through bevel gearing off the intake camshaft. A bracket is attached to the rear end of the front pair of cylinders to form a support for the vertical shaft at its upper extremity, and a grease cup is provided to maintain proper lubrication of this part.

The flywheel, which is bolted to the flange on the end of the crankshaft, is 17.5 inches in diameter, and has a female member of the cone clutch machined in the inner periphery of the rim, which is 4.375 inches wide. The clutch is of the cone type, with three separate springs, which transmits the power from the motor to a three-speed gearbox, the shafts being placed horizontally and are carried on annular type ball bearings. The rear axle is of the full-floating type, the main housing is composed of two substantial, pressed-steel members, welded together at the top and bottom by the autogenous process. The differential and driving gearing are supported by a steel casting, and are always maintained in proper relation to each other. The differential with its bevel gear is adjustable with reference to the pinion, and the pinion is also adjustable by a locking collar in front of the pinion bearing, which insures proper meshing of the gears. The propeller shaft connecting the transmission and the differential has two universal joints, and the torque of the rear axle is taken care of by a V-formed torsion bar terminating at its forward end in a spring damper attached to a cross member of the frame. The rear end spans the differential housing and provision is made for an oblique hinge movement.

Two sets of brakes are provided, acting respectively upon the interior and exterior of the brake drums attached to the rear driving wheels. The wheelbase of the 40-horsepower model is 120 inches long, and the thread is standard, 56 inches. The suspension of the pressed-steel chassis, which is narrowed in front, is taken care of by semi-elliptic springs at the forward end, three-quarter-elliptic springs being used at the rear, the back end of the frame having a slight pick-up to adequately take care of this style of suspension.

The Corbin 30-horsepower differs from the larger type in so far that the cylinders are cast with L-shaped heads, the valves being placed side by side and operated from a common camshaft. The bore of the 30-horsepower model is 4.5 inches, while the stroke is slightly less, being 4.25 inches.

The valve lifters are in bronze guides, which can be easily removed, as they are attached to the camshaft housing by double stirrup fittings, held in place by one bolt. The valves are of the nickel steel, head and stem being formed integral. The valve springs instead of being the conventional form are coned at the lower ends and deliver their pressure against a large splitpin passed through the valve stem, no collars or keys being employed. The raising effort of the cam is not taken directly by the plunger, but upon the lower end of the lever interposed between it and the cam. The plungers are fitted with hardened set screws having check nut retention, so that the clearance between them and the valve stems may be accurately maintained.

The entire camshaft assembly is housed in a separate case which forms a unit that can be separately assembled and applied to the side of the motor base, as shown in Fig. 5. The pistons have four rings and two oil grooves. The wristpin is a hollow piece of special steel with hardened surfaces. This is machined on a slight taper and formed in the piston bosses, where it is retained by a set screw with a pin at the end projecting in the interior.

The connecting rods are forgings of special steel and have hinged lower caps, affording adjustment by tightening one bolt. By removing large plates at the side of the case, these are easily reached for either inspection or adjustment. The upper ends of the connecting rods are bushed with bronze, the lower ends have bearings of white metal.

The cylinders are mounted on an aluminum member, which forms the upper member of a two-part crankcase, surmounting an oil basin of the same material with dual oil pits. The crankshaft bearings are not in the upper half, but in the oil basin, the top portion merely supplying caps for the ball bearings carrying the crankshaft at the outer journals. The lower crankcase member has three intermediate bearings, bushed with white brass, which suport the inner three of the five shaft journals.

The oil basin and motor basin are held to the cylinder lugs by long through bolts, the heads being under the oil basin, the nuts on the top of the cylinder base flange. The rear end of the lower half of the engine base spreads to form a shield for the flywheel and clutch, and as the gearset casing is similarly formed at the forward end, it is bolted to the flywheel shield and a unit power plant construction obtained. The front end of the motor assembly is supported by an I-section steel cross-member. Steel plates attached to the chassis frame side-members and extending to the crankshaft not only act as a brace and support of considerable length, but serve to enclose the whole front portion of the chassis.

Lubrication is by a special pump system, the oil supply being carried in a tank above the flywheel. A sliding valve pumps into this supply and forces it through leads to the four cylinders. Splash wells are provided in the crankcase, which are filled by other leads leading from the tank. The three central bearings are fitted with caps, which receive the oil that is splashed up by the connecting rod ends, thereby feeding the main bearings. The clutch and gearbox on this model are almost identical with the 40-horsepower model, but a difference is made in the rear axle which is of the fixed type. The wheelbase is 115 inches. The price of the 40-horsepower model is $3,000 and the 30-horsepower, $2,000.

# Selecting an Automobile

*When the average man has decided to buy an automobile after a long and careful consideration of the expense involved and the return either in business or pleasure to be had from the same he generally becomes the victim of not only the ever-alert salesman but also of his best and dearest friends.*

TO the man of moderate means the purchase of an automobile is, like breaking out of jail, a thing not to be lightly undertaken. After a careful consideration of the greatest amount of money which can be invested, he looks about in the manner of all sensible men for the greatest possible value to be obtained for the money. If he is the possessor of friends who own automobiles he invites their opinion and advice as well as that of the sales agents of the concerns who furnish a car at the desired price.

The advice of his friends is apt to be biased, as it is gained from one-sided experience, while the advice of the salesmen, although perhaps the result of much experience, is hardly less biased. A demonstration may prove much and it may prove very little, so the prospective automobilist does not know which way to turn. The wise man, however, buys a car of good repute with a solid guarantee, or in the case of a car unknown, has it thoroughly examined by a competent judge.

The style of body purchased will, to a large degree, determine whether the automobilist will be satisfied or disappointed after he has had the machine for a length of time. It is in this feature that the purchaser may rely upon the company from whom he is buying the car, as the great experience of the dealer will aid his judgment in this respect.

# As to the Merits of Vanadium

## Further Pertinent Discussion on the Subject

*In the issue of "The Automobile" of July 27 the criticisms of George L. Norris appeared in reply to an article from the pen of E. F. Lake upon the subject of alloy steels, and incidentally Vanadium, together with E. F. Lake's reply. Mr. Norris again replies to Mr. Lake, quoting chapter and verse, and an opportunity has been given to Mr. Lake to reply.*

### George L. Norris Criticises E. F. Lake's Position

MR. LAKE'S reply to my letter in which I take exception to his statements relative to vanadium opens that I state the article in question "is worthless." I did not make such a statement.

The reason why tests or data to illustrate the beneficial effect of vanadium as a constituent of the steel were not given was simply because it was not considered necessary in view of the great prominence attained by vanadium steels during the past eight or nine years, and the many treatises and articles containing such tests that have been published. The inference that they could not be produced is unwarranted, as previous articles by Mr. Lake and also the 1911 edition of his book on "Composition and Heat Treatment of Steel" prove that he has seen many of these and accepted them as showing that vanadium does add of itself virtues to steel. It would be a pleasure to submit not only the already published tests and opinions of metallurgists of international and local reputation, but also a large amount of unpublished material. I would say that a careful search of the literature of steel fails to reveal any of the countless tests mentioned by Mr. Lake in which vanadium steels failed to nearly approach chrome-nickel steels in static or dynamic qualities.

I know of no metallurgist or steel maker who has investigated or made vanadium steel who has gone on record that "the main mission of vanadium is as a scavenger." Among the investigators are such eminent metallurgists as Arnold, Guillet, Putz, Harbord, Longmuir, Law, Mathews, J. Kent Smith and others. With the exception of J. Kent Smith none of those mentioned refers to or lays any stress on the action of vanadium as a scavenger. This is remarkable when we consider the great amount of work done by such thorough, painstaking and acute observers as Arnold and Guillet, not to mention the others.

J. Kent Smith was undoubtedly the originator of the statement that vanadium is a powerful scavenger, but he never in public discussions made any such statement. Neither have I, as his successor, made any such statement. The literature of our company distinctly states that vanadium exerts its power in at least three ways, one of which is scavenging. It also distinctly states that an extra amount of vanadium must be added for this very purpose. Mr. Lake has this literature and I do not see how he can even carelessly read it otherwise.

How Professor Arnold's positive statement, "Vanadium is *undoubtedly* the element which, together with carbon, acts with the greatest intensity in the way of improving the iron," can be said to be qualified with a word of doubt is beyond comprehension. Neither is Professor Arnold's expression of opinion of the way vanadium acts or exercises its influence qualified. It is a simple, straightforward statement, or opinion, based on experimental facts available at the time, and never since modified by Professor Arnold in any additional contributions he has made to the literature of vanadium steels. Harbord, in his "Metallurgy of Steels," accepts Professor Arnold's conclusions and uses them without any of the qualifying explanations suggested by Mr. Lake. The statements regarding vanadium steels in Mr. Lake's book, 1911 edition, revised and corrected, and in previous articles by him on vanadium steels are completely at variance with his statements in his article of June 29 and his reply in THE AUTOMOBILE of July 27. I am at a loss to understand the remarkable change in Mr. Lake's opinion of vanadium as shown by the following statements:

AUTOMOBILE, *June* 29, 1911.

"Vanadium of itself adds no virtues to steel. When it has cleansed the steel of impurities it has performed its mission; thus, it is as well to allow it to go off into the slag as to try to keep any in the steel.

"Of the vanadium steels very little, if any, vanadium is present in the finished product, and hence vanadium steel is a misnomer."

AUTOMOBILE, *July* 27, 1911.

"Vanadium of itself adds no virtues to steel. In trying to refute this statement, he (Mr. Norris) says, 'The experience of a large number of steel manufacturers is overwhelmingly opposed to this statement—it is a question of having the vanadium in the steel because by countless tests it has been proved that vanadium produces definite beneficial results. Why has he not submitted one of these?' This element (titanium) will give practically the same results that are obtained with vanadium, and its growing competition may be the cause for the claims that vanadium of itself, in the proper percentages, adds to the static and dynamic properties of steel."

AUTOMOBILE, *July* 27, 1911.

"Countless tests have been made with vanadium-treated steels in comparison with other steels, but not one of these tests has shown us that vanadium-treated steels equal either the static or dynamic properties of chrome-nickel steel; in most cases they could not nearly approach it."

AUTOMOBILE, *July* 27, 1911.

"The mere statement that a large number of steel manufacturers are producing vanadium steels regularly proves nothing *except that they are supplying a demand.*"

AUTOMOBILE, *July* 27, 1911.

"Neither in my original article nor in this answer to Mr. Norris have I said that vanadium did not produce beneficial results when properly *alloyed* and used in the correct proportions.

*"Composition and Heat-Treatment of Steel,"*
1911, *page* 104.

"Vanadium has made great strides in the past few years as an *alloying* element, and is used in steel castings, cast iron, and the bronzes and brasses as well as in steel mill products."

*Page* 119.

"Vanadium has given such good results in rolled steels that it has been taken up by some of the steel foundries." (Then follows a comparative test very favorable to vanadium.) "Before adding vanadium in the furnace it is necessary to have the oxides all removed from the metal as vanadium has a great affinity for oxygen. If any of the oxides remain in the metal, the vanadium will scavenge them out and go off in the slag; but as vanadium is too expensive to use as a scavenger, the oxides should be removed as completely as possible before it is added to the steel." "Many failures in the use of vanadium in the past have been due to this elusiveness, or its affinity for oxygen, etc. As a matter of fact, it might have completely oxidized out of the metal *and not given it any of the desirable properties of which it is capable.*"

*"Vanadium Steel" — Machinery, Oct.*, 1907.

"While vanadium affects steel in a manner that tends to increase the static strengths of other alloys, it also raises the dynamic properties to an extent that is not thought of in other alloys." (This article also contains numerous tests and illustrations demonstrating the beneficial effects of vanadium when alloyed with chromium, etc.

*"Composition and Heat-Treatment of Steels,"*
*Page* 123.

"A chrome vanadium steel will give as great strength as a nickel-chrome and can be forged as easily as a 0.40% carbon steel."

*Pages* 99 *and* 100.

"When chrome is *combined* with nickel or *vanadium* it makes the strongest, toughest and best wearing steel on the market, etc."

"The nickel-chrome steels are difficult to forge—it must be heated many times to forge pieces of any size of intricate shape." (The demand for vanadium steels is explained by the above.)

The usual loss of vanadium in steelmaking, excepting the electric furnace process, where there is no loss, is from 10 per cent. to 20 per cent. Now, if the steel maker can attain all the benefits possible through the scavenging action of vanadium and only wants to leave it in to prove to the chemist that it was used, why does he leave in three or four times as much as the chemist can readily determine? In protective deckplate where no chemical proof is required—because the Government does not distinctly specify composition, only physical and ballistic tests—I am assured by the manufacturers that they cannot meet the requirements if they use vanadium solely as a scavenger, or do not exceed a certain percentage in the steel. I am assured by other steel makers that such has also been their experience.

In the manufacture of electric furnace steel vanadium does not act as a scavenger, it cannot, owing to the highly reducing conditions in the furnace. If added in the form of vanadium oxide it would be reduced. All the vanadium added to an electric furnace is found in the steel. This I know from my own experience, and also by reports from electric steel makers. There is no reason to expect that because metals are melted or refined in an electric furnace their metallurgical, chemical or physical qualities will be radically changed, in fact, the electric steel makers of to-day are simply claiming equality with crucible steel. I have under way an extensive series of tests covering open-hearth steel, both basic and acid, crucible and electric furnace steels, with and without vanadium, and I can assure Mr. Lake that the electric furnace steels are showing the same relative improvement through the use of vanadium as the steels made by the other processes.

In a lecture before the Franklin Institute, May, 1909, after three years' experience with electric-furnace steelmaking, Dr. John Mathews makes the following statement: "The chrome-vanadium alloys are preferably made in the crucible or *electric* furnace, although the open-hearth process is also much used for the purpose." "By judicious *blending* of chromium and vanadium and adjustment of the manganese and carbon, one can not only obtain all static properties that can be obtained from nickel, chrome-nickel or silico-manganese alloys, but in addition obtain dynamic or anti-fatigue qualities far in excess of those displayed by any other alloys. In general, nickel-chrome steels possess excellent static qualities, but the difficulties in heat-treatment, forging and machining lead one to prefer the other types of alloys previously mentioned." "The number of alternations of stress to produce fracture gives a measure of vitality, so to speak. Average results of a great many tests made in this way of crucible carbon springs, chrome-nickel, silico-manganese and genuine crucible chrome-vanadium springs proves the extraordinary quality of the last-named product. The average figures for alternations were as follows: Crucible carbon spring, 150,000; chrome-nickel and silico-manganese, each 200,000; chrome-vanadium, 5,000,000 and still unbroken."

Longmuir in May, 1909, presented a paper before the British Iron and Steel Institute on "High-Tension Steels," in which direct comparisons were made with nickel steels, chrome nickel steels and chrome-vanadium steels. It happens that one of the chrome-nickel steels has approximately the same composition as Mr. Lake's ideal steel:

| | Longmuir. | Lake. |
|---|---|---|
| Carbon | 0.30% | .25% |
| Nickel | 5.00% | 4.50% |
| Chromium | 1.00% | 1.50% |

The physical properties of this steel are given in the following table:

Nickel-Chromium Steels

| No. | Condition. | Elastic limit, tons per sq. in. | Maximum stress, tons per sq. in. | Elongation, per cent on 2 in. | Reduction of area, per cent. |
|---|---|---|---|---|---|
| 31 | Treated, i.e., | | ETAOIN N..N N.. N..N N | | |
| 32 | quenched in | 59.63 | 66.23 | 16.0 | 38.6 |
| 33 | water from 850° | 52.42 | 61.16 | 18.0 | 41.6 |
| 34 | C. to 900° C., | 59.74 | 64.28 | 19.5 | 47.2 |
| 35 | and tempered at | 56.70 | 63.66 | 20.0 | 43.4 |
| 36 | 550° C. | 55.08 | 61.88 | 21.0 | 45.4 |

Compare with this the physical properties given of a chrome-vanadium steel of practically the same carbon: Carbon, 0.32 per cent.; chromium, 1.10 per cent.; vanadium, 0.16 per cent.

Treated Chromium-Vanadium Steels

| No. | Test cut from | Elastic limit, tons per sq. in. | Maximum stress, tons per sq. in. | Elongation, per cent on 2 in. | Reduction of area, per cent. |
|---|---|---|---|---|---|
| 56 | 1-in. diameter bar | 63.48 | 67.68 | 17.0 | ..... |
| 57 | Crank | 56.44 | 64.78 | 15.0 | ..... |
| 58 | Axle | 61.34 | 67.32 | 17.0 | 33.6 |
| 59 | Axle | 56.16 | 63.12 | 22.0 | 47.2 |

Mr. Longmuir's conclusions are: "The work done shows that nickel steels do not give the high values obtained from nickel-chromium, or chrome-vanadium. The last two represent exceptionally good types of high-tension steels, but for all-around properties chrome-vanadium gives the best results."

The above tests practically confirm the statement in Roscoe & Schorlemer's treatise on chemistry, that "vanadium acts in a similar manner to nickel, but is much more efficient, 0.20 per cent. producing the same effect as 3 to 4 per cent. of nickel."

I can assure Mr. Lake that the "growing competition" of titanium as a scavenger is not "the cause for the claims that vanadium of itself, in the proper percentages, adds to the static and dynamic properties of steels." These claims for vanadium have been made from the very beginning by disinterested investigators of high standing.

## Mr. Lake Answers Mr. Norris' Second Criticism

The tone of Mr. Norris' second criticism has been considerably changed, and in it some evidence and data are given on which a discussion can be made as to the real merits of the case. To merely say that "the great prominence obtained by vanadium steel during the past eight or nine years was the reason why no tests or data were given" is to dodge the issue. To say "it would be a pleasure to submit not only the already published tests and opinions of metallurgists of international and local reputation but also a large amount of unpublished material" proves nothing, unless more than opinions are submitted. It is a bold assertion when he says, "the inference that they could not be produced is unwarranted" if facts are not produced.

When he says "a careful search of the literature of steel fails to reveal any of the countless tests mentioned by Mr. Lake in which vanadium steels failed to nearly approach chrome-nickel steels in static or dynamic qualities" it might be that none of these had been recorded and brought to his attention. On the other hand, in the large amount of research work I have done since vanadium came into commercial use, I have failed to find any reliable tests where vanadium steels equaled, much less excelled, the physical properties of chrome-nickel steel that was properly made and heat-treated. One or two instances have been given such as Mr. Norris submits in the latter part of his discussion when he says, "The average figures for alterations were as follows: Chrome-carbon spring, 150,000; chrome-nickel and silico manganese, each, 200,000; chrome-vanadium, 5,000,000 and still unbroken."

These figures would indicate to me that, either a very poor grade or an improperly heat-treated chrome-nickel steel was used when it only showed 200,000 alternations. I have seen chrome-nickel steel withstand 2,250,000 alternations and have heard of other tests that gave better results than this. I have also seen steels tested on the White-Southers rotary vibrational machine in which an open-hearth low carbon steel withstood 2,660,000 revolutions, while steel that was very similar to the vanadium products withstood a little over 25,000,000 revolutions at the same fibre stress. While this comparison was between a low-grade, cheap steel, and a high-grade one, it only made one about ten times greater than the other. In Mr. Norris' comparison, however, it is to be supposed that the chrome-vanadium and chrome-nickel steels are both of the highest grade and properly heat-treated. Therefore, to make one withstand 25 times as many alternations as the other seems beyond reason and unbelievable. Such a difference could not exist unless test bars from the very best grade of chrome-vanadium steel were used to compare with those from a very poor grade of chrome-nickel steel or unless the heat-treatment was such as would make one steel fail long before the other, or both.

Since Roscoe separated the element vanadium in the '60's much experimental work has been done. It is only within the last decade, however, that vanadium has had a commercial application in practical steel making. Of the metallurgists whom Mr. Norris mentions as investigators of vanadium, J. Kent Smith is the only one that has specialized on this subject. The others have spent most of their time working on other steels and have doubtless accepted Mr. Smith's statement that "vanadium is a powerful scavenger." It might be added that this was the only statement that Mr. Smith emphasized. When Mr. Norris says, "I know of no metallurgist or steel maker who has investigated or made vanadium steel, who has gone on record that the main mission of vanadium is as a scavenger," I might say I know of none who have said that the main mission of vanadium is *not* that of a scavenger. After these two seemingly opposite statements have been made, nothing is gained and those selling the alloy might be the only ones to contradict either statement. Even at that they might both be true.

The comparative tests that the makers' literature has given me are all between carbon steel, nickel steel and vanadium steel. In most of these, chrome-vanadium steel has been compared with Government nickel steel, or in other words, the highest type of vanadium steel has been compared with a nickel steel that is not of the highest type. When this fact was presented to J. Kent Smith in July of 1907, he informed me that experiments were being conducted to show the physical and dynamic differences between chrome-nickel and chrome vanadium steel. As four years have elapsed and none of this data has been given out, I am perfectly justified in forming the conclusion that the tests did not show superior results for vanadium. Therefore, I again say that none of the vanadium steels equal the chrome-nickel steels in physical properties.

Mr. Norris says, "I have under way an extensive series of tests covering open-hearth steel, both basic and acid, crucible and electric furnace steels, with and without vanadium; and I can assure Mr. Lake that the electric furnace steels are making the same relative improvement through the use of vanadium as the steels made by the other processes." This again is only a statement without any data or facts being given to prove the assertion and until such data is forthcoming, we have the right to express our doubts.

While we know that great improvements can be made in certain grades of steel by the addition of vanadium, we still hold to the opinion that the high-grade chrome-nickel steels are the superior of vanadium steels. While there have been many exaggerated statements made in regard to vanadium, it is a rare thing for anyone to claim that the vanadium steels equal the chrome-nickel steels in physical properties. Investigations or experiments to prove this are also seldom made. From all the evidence I can gather, well-made vanadium steels are excellent material and probably the chrome-nickel steels are the only ones that excel them. The vanadium steels are much easier to machine than nickel-chrome steel and as they sell for a lower price, they are excellent steels for automobile uses.

It is impossible for one man to investigate all kinds of steels thoroughly or to know everything about steel. Thus the statements of others have to be accepted when they appear to be correct. That there is a great deal of commercialism in the steel business and that many a good metallurgist has had his opinions biased by this commercialism cannot be denied any more than it can be denied that the noted chemist Dr. Wiley encountered troubles when he tried to make the prepared food companies leave poisons out of the foods. To do so meant some loss of profits to the companies and thus an attempt was made to remove him.

From the commercial metallurgists, we are liable to get data, results of tests, etc., that only tell part of the truth. This often misleads others who are earnestly seeking for facts and at times might cause them to make false statements unknowingly. There is so much commercialism in the steel industry that it is very difficult to get at any real facts in regard to data, tests, etc., or any just comparisons of different grades of steel.

Then again, investigations and discoveries are being made every day that upset former theories and opinions that appeared to be facts. No man has yet lived who did not change such opinions when presented with data that disproved them. Because a man said something in the last century, the last decade, last year, last month or even yesterday, it is absolutely correct, is a very false principle on which to establish an argument. This argument, therefore, should be based on what is and not on what has been.

Because I said a certain chrome-nickel steel gave good results, it does not warrant Mr. Norris in branding it "Mr. Lake's ideal steel," as there are many other compositions of chrome-nickel steel that might give as good, if not better, results. The improvements that are continually being made do not make me desirous of calling any particular composition my ideal steel. Then again it is not fair to compare it with Longmuir's steel that contains 1-3 less chromium, 1-9 more nickel and 1-5 more carbon. When this is done, however, it does not show any great difference in their tensile properties and does not attempt to show any difference in their alternations.

While I do not like to bring others into this discussion, Mr. Norris has twice quoted Dr. John A. Matthews. Within one month, either way, from January 1, 1908, I talked with Dr. Matthews in Syracuse, N. Y. At that time he was very much opposed to vanadium and severely criticised some of the statements I had made in regard to it, and which Mr. Norris is now quoting from *Machinery*, October, 1907. There was no electric furnace in the plant with which Dr. Matthews was connected. In May, 1909, he delivered the lecture Mr. Norris mentions. In the Halcomb steel plant, of which Dr. Matthews was then president, an electric steel-making furnace was located. It was one of the first that had been installed in this country and was in very poor condition when he took hold of it, as the former management had made it a failure. Thus instead of three years' experience with electric furnace steel making, as Mr. Norris says, Dr. Matthews had less than half of that at the time he delivered the lecture that Mr. Norris quotes from.

That vanadium produces some very good results when used in steel making cannot be successfully denied. Whether it has completed its mission when it acts as a scavenger or whether it adds, of itself, certain properties to steel, is a much disputed question. That I take the former position is due to the fact that this has been thoroughly demonstrated. The latter position, however, needs a great deal more data to prove the theories advanced and until this data is forthcoming I cannot accept Mr. Norris' theory. In either case, however, it is more of an argument for the metallurgists and steel makers than for the readers of THE AUTOMOBILE. They are more interested in the practical results obtained from the metal than in the eutectic, solid solution, oxidizing, scavenging or other forms or reactions the elements may enter into in the manufacture of the product.

That oxygen, nitrogen and hydrogen are present in steels in larger percentages than have formerly been supposed and that these are as injurious to the metal as phosphorus and more injurious than any of the other elements, has now become well recognized. That these may take the form of occluded gases, or microscopic bubbles, or segregate in quantities sufficient to produce holes large enough to be seen with the naked eye, termed blow-holes, is an undisputed fact. That they unite with other elements and cause these to injure the metal is also fast becoming recognized.

These gases are present in the largest percentages in steels made by the Bessemer process; open-hearth steels are second in the percentage of gases present, with crucible-made steels third, and electric steels fourth. In the electric furnace they can be reduced to very low percentages, owing to the ability to protect the liquid bath from the atmosphere and also to use slags that will keep them out or cause their removal. Steels made with the crucible process are not very high in these gases, as the crucibles are sealed up and thus protected from the outside air.

With any of these processes, unless it be the Bessemer, "vanadium can be properly *alloyed* and used in the correct percentages" to remove the larger part of the gases left after the steel has been refined by other methods, and prove on chemical analysis that it is a vanadium steel. This in no way contradicts my statement in THE AUTOMOBILE of June 29, when I said "vanadium of itself adds no virtues to steel, etc." When thus used the vanadium will greatly increase the static strengths of the metal, bring the elastic limit up close to the tensile strength and add greatly to the dynamic properties. To expect to make any of these twenty-five times what the metal formerly was is expecting altogether too much. If they are doubled or trebled, a great improvement has been made and the alloying material is well worth its cost.

That greatly increased physical properties can be obtained in steels that are carefully made in any of the steel-making processes over the ordinary commercial steels that can be turned out is as much a fact as that much better and finer work can be made in any other manufacturing line if time enough is taken to do so. Tests are often made with a specially prepared steel of a given kind and comparisons made with it from stock steels of noted brands. Such comparisons cannot help but be misleading and produce unfair comparisons.

The impurities, which are the real weakening elements of steel, can be much more readily removed in a small furnace making a small batch, or heat, of metal than in a large furnace making a large one, and it is therefore unjust to compare the physical properties of one steel made in a small heat and another steel made in a large one, no matter what the method or process by which it is made. It is too often the case that our comparative tests are obtained in this way.

## When Turning a Curve

*When rounding a curve with a heavy automobile there are a number of stresses set up in the car at any speed. These stresses become more severe as the speed increases, but the strains increase in intensity with the square of the speed, so that a little added speed means greatly augmented stresses.*

AN automobile to be safe must, under all conditions, be in a state of stable equilibrium. This is a condition which is very simply maintained when the car is standing still, or when running at moderate speeds along a level road, but when a srarp turn is negotiated at high speed the matter becomes of an entirely different nature. Referring to Fig. 1, two roads of width S are depicted crossing each other at right angles. In turning from one into the other a turn of radius R is made, this radius being very nearly equal, as a rule, to the width of the road. As the car goes around this curve it is acted upon by a force which tends to throw it away from the center in the same way that a ball tied upon a string and swung around will tend to break the string and fly away from the hand which is swinging it. This force is called the centrifugal force, and its pull in pounds is denoted in the figure by F.

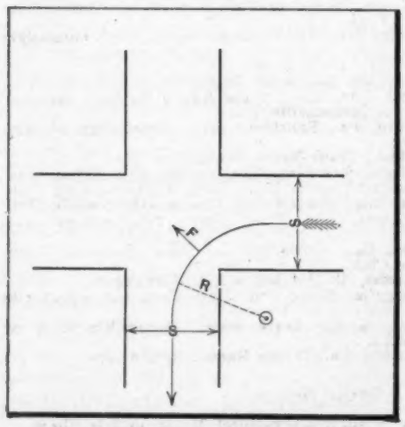


Fig. 1—Diagram of course usually taken in rounding a curve—S is the width of the road, R the radius of the curve and F the direction of the centrifugal force

In a body which is subjected to the stresses of weight and centrifugal force, they may be figured as acting at the center of gravity of that body. So that it is easy to see that when the car is subjected to the force due to its turning the curve, there is a marked tendency for it to turn over, the amount of which is measured in foot-pounds by the product of the centrifugal force in pounds and the height of the center of gravity of the car from the ground in feet. Referring to Fig. 2, let G be the center of gravity of the car, F the centrifugal force in pounds, a the height of the center of gravity above the ground in feet, b one-half the tread or the distance of the center of gravity from the point of contact of the wheel with the ground, measured horizontally. W is the weight of the machine acting vertically downward from the center of gravity, A and B are the points of contact of the wheels and the ground. As the car is turning a curve the righting leverage must be greater than the upsetting moment to keep the car in stable equilibrium; that is, Wb must be greater than Fa. In case the car should turn over, owing to the fact that Fa was greater than Wb, it would turn over about A, the outside wheels.

The speed at which the two moments are equal in turning a curve of given radius is called the critical speed. At this point the car is in neutral equilibrium; that is, if it should be slightly inclined, it would tend to fall still further out of the perpendicular instead of tending to return to its normal position. This speed can be determined by equating the two moments and solving for the speed, as follows:

Let $aF = bW$ (Fig. 2).

$$F = \frac{Wv^2}{gR} \text{ therefore } \frac{aWv^2}{gR} = bW \text{ and } v^2 = \frac{bgR}{a} = 32.16\frac{bR}{a} \quad (1)$$

where the symbols are as described above for Fig. 2—and v is the critical speed.

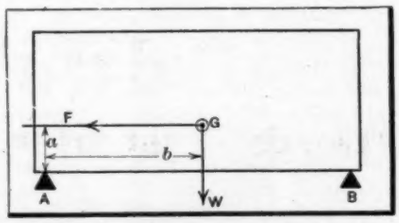


Fig. 2—Illustrating the upsetting and righting moments—G is the center of gravity, F the centrifugal force, W the weight of the car, a the upsetting arm, b the righting arm. A and B are the points of support

From the last equation it is seen that the greatest possible speed in turning a curve varies directly with b and R, and, inversely, with a. That is, it would be greater to maintain a greater speed around a given curve of radius R without overturning if the tread of the wheels or the radius of the curve were greater or the center of gravity of the car were nearer to the ground.

From the above it is seen that the weight factor is not of any influence in so far as the turning over of the car is concerned, since it is on both sides of the equation point. We are all aware though, that a light car will not "hold the road" as well as a car of greater weight. This is not because of its turning over on account of rounding a curve, but due to the side-slipping of the car which introduces entirely different factors. In this case the car is given a momentum away from the center of the road because the centrifugal force F is greater than the resistance to sliding of the wheels. To maintain equilibrium all forces must be balanced by equal and opposite forces. Hence the force F will have to be counteracted by the frictional resistance set up between the tire and the road which will be measured by the weight multiplied by the coefficient of friction. If the coefficient of friction is f, the critical point of side slipping will be reached when $fW = F$ or $f = \frac{F}{W}$. To determine the valuations of the different factors in a practical case, an example may be taken to show both the inclination of the car to turn over and to side slip.

Let W be 3,000 pounds; R, 20 feet; a, 2 feet; b, 2 1-3 feet, and v, 22 feet per second: F will equal $\frac{Wv^2}{gR}$ or $\frac{3000 \times 22 \times 22}{32.16 \times 20} =$

2257 pounds. This side pull F, exerts a turning moment over the outside wheels of aF foot-pounds or, in the above case of 4514 foot-pounds, which is resisted by the moment of the weight of the car about the outer wheels bW, which is equal to 7000 foot-pounds in this case. This leaves a margin of safety of about 2500 foot-pounds in the case considered. To find the critical speed of this car going at the above speed around the same curve, 7000 foot-pounds must be equated to aF or from the formula for the critical speed (1) $v = \sqrt{32.16 \frac{2.33 \times 20}{2}} = 27.4$ feet per second. That is, the car would turn over at a speed in excess of 27.4 feet per second, or 18 2-3 miles an hour, approximately.

Besides turning over the tendency of the car to slip sideways may be measured mathematically by equating the side pull F, which in the above case is 2257 pounds, and the frictional resistance of the road to the side slipping, which is measured by fW where f is the coefficient of friction, and is a constant for given road conditions. Equating: $3000\ f = 2257$ or $f = \frac{2257}{3000} = .752$. That is, if under the given conditions the coefficient of friction were .752, the car would be just on the point of slipping. It is seen that with a fixed coefficient of friction the resistance to side slipping depends directly upon the weight of the car.

While from a theoretical point of view the side slipping of the car would continue until the radius of the curve were changed or the road conditions were different, the skillful driver offsets the tendency by a skillful manipulation of the steering wheel, and the slipping is often confined in this manner to one pair of wheels; it is then known as a skid. In this case one set of wheels act as a pivot for the other pair. The skidding tendency is checked in many cases by disengaging the clutch and releasing the brakes so that the wheels are free to turn. On wet and slippery days when the coefficient of friction will be reduced to a minimum, the greatest danger ensues and curves are of necessity negotiated at the lowest possible speeds.

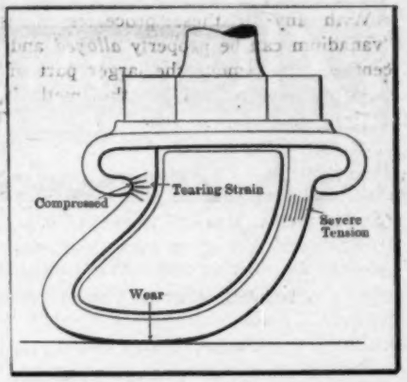


Fig. 3—Showing the strain on a soft tire in rounding a curve. The points of severest stress are indicated.

Two ways in which the life of the car or its parts may be made as long as possible in connection with driving around curves are throwing out the clutch and in maintaining the tires at the required pressure. The former is for the purpose of preventing unnecessary torsional stresses in the transmission and the latter to cut down the tire bills, which are always a little larger than the average motorist desires. Fig. 3 shows the distortion which takes place in a soft tire when turning a curve. Recurring strains of this kind will soon spoil the best of tires.

# Calendar of Coming Events

## Handy List of Future Competitive and Show Fixtures

### Shows

Jan. 1-5, 1912.....New York City, Grand Central Palace, Annual Show, Automobile Manufacturers' Association of America.
Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.
Jan. 10-17.....New York City. Madison Square Garden, Annual Show, Motor and Accessories Manufacturers.
Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers.
Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.
Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show under the auspices of the National Association of Automobile Manufacturers.

### Race Meets, Runs, Hill-Climbs, Etc.

Sept. 1.....Oklahoma, Reliability Run, *Daily Oklahoman.*
Sept. 2.....Pottstown, Pa., Track Races, South Jersey Motor Club.
Sept. 2, 3, 4.....Kansas City, Mo., Track Races, Automobile Club of Kansas City.
Sept. 2-4.....Amarillo, Tex., Track Races, Panhandle Auto Fair Association.
Sept. 2-4.....Brighton Beach, N. Y., Track Races.
Sept. 3.....Columbus, O., 200-mile Race, Columbus Automobile Club.
Sept. 4..... Scranton, Pa., Track Races, Automobile Association of Scranton.
Sept. 4.....Denver, Col., Track Races, Denver Motor Club.
Sept. 4.....Salem, N. J., Track Races. South Jersey Motor Club.
Sept. 4, 5, 6.....Old Orchard, Me., Beach Races, Old Orchard Automobile Association.
Sept. 6..... Detroit, Mich., Reliability Run, Wolverine Automobile Club.
Sept. 6-9.....Buffalo, N. Y., Grade I, Reliability Run, Automobile Club of Buffalo.
Sept. 7-8.....Philadelphia, Track Races, Philadelphia Auto Trade Association.
Sept. 8-9.....Hamline, Minn., Track Races, Minnesota State Automobile Association.
Sept. 9..... Augusta, Me., Hill Climb.
Sept. 9.....Cincinnati, O., Road Race, Fern Bank Dam Association.
Sept. 9.....Hartford, Conn., Track Races, Connecticut Fair Association.
Sept. 9.....Port Jefferson, L. I., Hill Climb, Port Jefferson Automobile Club.
Sept. 9.....Riverhead, L. I., Road Race, Port Jefferson Automobile Club.
Sept. 13.....Grand Rapids, Mich., Track Races, Michigan State Auto Association.
Sept. 15.....Knoxville, Tenn., Track Races, Appalachian Exposition.
Sept. 16.....Syracuse, N. Y., Track Races, Automobile Club and Dealers.
Sept. 18-20.....Chicago, Ill., Commercial Reliability Run, Chicago Motor Club.
Sept. 19.....Burlington, Vt., Reliability Run, Merchants' Protective Association.
Sept. 23.....Philadelphia (Point Breeze), Track Races, Philadelphia Automobile Trade Association.
Sept. 23-25.....Detroit, Mich., Track Races, Michigan State Agricultural Society.
Sept. 25-30.....Atlantic City, N. J., Convention and Exhibition of the Carriage Builders' National Association.
Sept. .....Denver, Col., Track Races, Denver Motor Club.
Sept. .....Steubenville, O., Hill Climb, Automobile Club of Jefferson County.
Oct. 6-13.....Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 7.....Danbury, Conn., Track Races, Danbury Agricultural Society.
Oct. 7.....Philadelphia, Fairmount Park Road Races, Quaker City Motor Club.
Oct. 7.....Springfield, Ill., Track Races, Springfield Automobile Club.
Oct. 13-14.....Atlanta, Ga., Track Races.
Oct. 14.....Santa Monica, Cal., Road Races.
Oct. 14 (to 25)....New York City, Start of the Annual Glidden Tour, en route for Jacksonville, Fla.
Oct. 16-18.....Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Nov. 1.....Waco, Tex., Track Races, Waco Auto Club.
Nov. 2-4.....Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 4-6.....Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 9.....Phoenix, Ariz., Track Races, Maricopa Automobile Club.
Nov. 9, 10, 12.... San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 27.....Savannah, Ga., Vanderbilt Cup Race, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Nov. 30.....Savannah, Ga., Grand Prize Race, Savannah Automobile Club.
Nov. .....Columbia, S. C., Track Races, Automobile Club of Columbia.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

### Foreign Fixtures

Sept. 2-11.....Roubaix, France, Agricultural Motor Vehicle Show.
Sept. 9.....Bologna, Italy, Grand Prix of Italy.
Sept. 10-20.....Hungarian Small-Car Trials.
Sept. 16.....Russian Touring Car Competition, St. Petersburg to Sebastopol.

THE AUTOMOBILE

Vol. XXV Thursday, August 31, 1911 No. 9

THE CLASS JOURNAL COMPANY
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231-241 West 39th Street, New York City

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FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

## THE ELGIN RACES

EVERYBODY connected with automobiling from a manufacturing as well as from a sporting point of view regrets the fatal accidents in connection with the national stock chassis races held last week on the Elgin circuit. These accidents arouse tremendous attention from ocean to ocean, but the saner element always deplores them. We can only mount to higher levels by profiting by the errors of the past, and every accident should be an object lesson to every manufacturer. The two Elgin accidents were peculiar. One that happened in practice remains a mystery. It occurred on a perfect stretch of roadway without a ditch on either side where the car ran onto the grass. The other accident on race day was also on a perfect roadway with ample width. In both cases a tire exploded, the car took the ditch and finally capsized in getting onto the roadway again. In a word the tire was the prime cause of the accident.

Tires will explode; the terrific heat generated by the fast pace is responsible for this and the remedy can only be found in the quick work of the driver. It calls for the quickest action on the steering wheel; often the quickest is not quick enough. If a front tire goes the exigency calls for a certain operation, and if a rear tire goes another course must be pursued. The majority of racing drivers are entirely familiar with these operations; they know what to do, but sometimes fate is against them. One partial remedy is always to make sure by inspection before each race that the tires are in perfect condition and securely fastened to the rims.

## PREVENT RATHER THAN CURE

MANY automobilists try to progress by driving through reverse gear when it comes to legislation governing the automobile. Every week or so we read of a new law being enacted restricting the speed of a motor car to four or six miles per hour on a corner or at a crossing, and a few weeks later we read of how the automobile owners have banded themselves together to fight the new law in the courts. The automobilists were a little slow. Instead of fighting in the courts they should have started before the laws were finally passed in the Legislature. It is easier to fight a bill in the Legislature than it is to carry it through all of the law courts and even up to the Supreme Court of the land. Prevention is better and cheaper than cure.

The automobile manufacturer and dealer is often too busy with his business of buying and selling cars to think of legislation before it is enacted, and when it is enacted he almost stampedes. One example of this is the recent prohibitive legislation in Detroit, the biggest automobile manufacturing city in the country. An absurd law has been passed; this law is being violated every day by practically every car owner; fines as high as $200 are being assessed and already thousands of dollars have been collected in fines. The money that has already been spent in fines would, if properly used before legislation was enacted, have resulted in the passage of a sane measure. What is happening in Detroit is happening month after month in a score of other cities. It is a Rip Van Winkle policy until the law is enforced and then a money-wasting one. Every locality should have its legal representative who watches all pending legislation and every effort should be made for rational legislation before it is too late. Banding together to keep an eye on possibly unwise legislation must not be interpreted as being opposed to all legislation. The object is to defeat irrational measures before their enactment, when it can be done at much less expense than after such laws have been passed by the Solons and inscribed on the statute books

* * *

## TELL THE TRUTH

ONE great detriment to the early popularization of the freight automobile is the tendency on the part of salesmen to overstate the benefits that will result from the installation of a motor service in a large commercial or manufacturing establishment. It would seem to be the part of wisdom that the prospective purchaser be told the exact requirements of the situation. He must not be allowed to buy under the delusion that his trucks and delivery wagons may be safely entrusted to the tender mercies of the erstwhile teamster, boy or man, lacking experience and working for wages which are anything but an incentive to the acquisition of the knowledge requisite to a proper performance of his duties. Nor must the purchaser be allowed to go on his way without being warned of the dire results which will follow upon the overloading of his trucks and wagons. A freight automobile system should not be installed without thorough preparation; drivers should be trained and all the details of the system—repairs, relief and service—should be reckoned with before undertaking such a radical change.

# Progress Shown in Elgin Races

## Fast Time Indicates Improvements in Cars

*H. A. Bonnell, General Manager of the Automobile Board of Trade, points out the great lessons to be learned from the recent Elgin National Stock Chassis races, particularly emphasizing the advancement in the art of building automobiles on stock lines and for stock purposes.*

RACES such as those held at Elgin last Friday and Saturday demonstrate the progress in making automobiles about as forcibly as anything could, according to H. A. Bonnell, general manager of the Automobile Board of Trade. Improvement in the course undoubtedly had some effect upon the fast time made this year, but it would hardly account for the tremendous reductions of the record in three of the races. In discussing the matter Mr. Bonnell said:

"That there has been great progress made in the manufacture of automobiles this year is clearly indicated by the splendid showing made by the stock cars that competed over the Elgin course last week. The roads were in better shape than ever before and a number of narrow places had been improved, all of which means that the normal time ought to have been faster than in previous years, but hardly as much as the actual figures show, unless some betterments had been made in the construction of the cars themselves.

"Take the showing of the Lozier entry in the Elgin National race. Last year the Lozier car won a splendid race rather easily in 292:29:84, or an average of 62.5 miles an hour. This year, with substantially the same type of car, which of course carried the improvements and refinements of the current model, the speed made by it was 69.78 miles per hour for eight laps. A difference of over 7 miles an hour in the rate of speed accomplished could hardly have been credited in its entirety to the difference in the condition of the course. The car itself must have been faster.

"The mishaps that befell several of the contestants in the big race at various stages of the event might all be laid to increased vibration caused by minute bumps in the roadway, which would argue that much more emphasis should be laid upon the quality of the cars themselves. These mishaps included burned-out bearings, broken gasoline line and the fracture of parts that were particularly subjected to the intense vibration, all of which are accidents likely to occur from the combination of great speed with uneven roads.

"National 2, driven by Zengel, which won the race, made the thirty-six circuits almost seventeen minutes faster than the winning time of the Lozier in 1910 and averaged better than 66 miles an hour throughout. From any angle this performance is excellent as it means the sustained speed of the fastest railroad train carried over a distance that would discourage the best equipped railroad in the world. Twice the winner paused for fuel and then went on without a skip to a fine victory. It means that if there was a protected, straightaway speedway from New York to Chicago a business man might make the distance in five or six hours less than the great railway trains, if he happened to be in a big hurry.

"Of course the difficulties that were met in the Elgin roads really served a purpose in detecting weaknesses and while the mishaps that caused the withdrawal of several of the cars were trifling in themselves they were sufficient to insure defeat despite the fact that they could have been repaired with but small delay. When the leading group in a long race, such as the Elgin, is making better than 66 miles an hour and going along without a miss it is little use to take a handicap of fifteen minutes of half an hour by making repairs and then run the chance of again breaking down in the tremendous spurt that would be necessary to bring a car back into contention for the lead.

"The inexorable rule of mechanics that wear on tires and mechanism is in proportion to the square of the velocity, while the speed is represented only by the velocity itself, is one of those things that cannot be avoided in making up time and the right thing to do under the circumstances is to withdraw. Take for example the experience with Alco 7 (Hartman). According to the reports, this car suffered a break in its gasoline line while going nicely in the last half of the race. Such an accident is not sufficient to retire a car from competition, but to repair it would require probably 15 minutes. The car was not right up among the leaders when the mishap occurred and if it had continued it would have been heavily handicapped. If Hartman had tried to make up the lost ground by opening wide his throttle the chances of accident would have been emphasized.

"The running of the Illinois Cup race proved to be a rather hollow victory for the National also, but the fact should not be lost sight of that all four cars entered in this event were running smartly at the end and that all would have finished in good time if they had been allowed to proceed. The winner beat the time of last year's winner by 15 minutes. In the Kane County race for 231-300 cars the most astonishing showing was made. Seven cars out of the eleven that started completed the full distance and the winner lowered the record of last year in this race over 27 minutes.

"The cars that ran in the Kane County Cup race are automobiles such as the average owner drives and such as one may see on the streets and boulevards at any time. Those in the Aurora Cup race are lighter cars than the contestants in the Kane County race, while the entries in the Illinois were big cars with power enough to keep them away from the dust of almost anything they are likely to meet on the road. In the Elgin National the contestants were not limited as to piston displacement save that they were obliged to be under 600 cubic inches. This let in the highest powered cars manufactured in the United States in stock models.

"Now the best of such races as those run at Elgin is the fact that they are supervised by technical experts to the end that the public may be assured that the cars that perform in competition are identical with the cars of the same model sold over the counters of the various automobile salesrooms. The average buyer does not wish to enter track or road competition, but he does want to know that simple pressure on the accelerator will develop high power and great speed.

"The idea of such races as those at Elgin is to afford an object lesson to the public. The whole effort is made to show automobile owners and prospective buyers the quality of the contestants. In special races there are two objects, first to afford the public a spectacle and second to show manufacturers the merits and demerits of their special productions. The recent Indianapolis race is within this latter category, while the Elgin races come directly within the former.

# Detroit in the News of the Week

## Cadillac Cars to Have Electric Self-Starter

*Studebaker Corporation invites 1800 dealers to visit its plants—Automobile industry has almost doubled Michigan's investment in manufacturing within five years—General Motors stock now formally listed in the big exchanges—Chalmers predicts record year for industry and points out advantages of export trade and danger of over-production—Packard truck completes transcontinental run in forty-seven days from start to finish.*

DETROIT, Aug. 28—Formal announcement of the 1912 Cadillac, awaited with interest by the entire trade for some time, has been made at last, and reports of radical innovations, current for some time as matters of gossip, were confirmed in part. According to the announcement, the new Cadillacs will be equipped with an electric device capable of automatically starting the motor, furnishing current for all the lights, and supplying ignition for the motor. The device is of the storage battery principle, a dynamo generating electricity being attached to the motor.

The starting device is operated by retarding the spark lever and pushing gently down on the clutch. It is said that the battery when charged, is capable of turning the motor for 20 minutes. When the motor starts its explosions, the electric device stores up current until full charged, when it automatically cuts off from the motor. As an ignition device, the Cadillac's equipment will furnish a spark at slow speeds from the storage battery. At 300 r.p.m. the apparatus shifts automatically and furnishes the spark through the high-tension system.

Other changes announced for the 1912 Cadillac are 36-inch wheels, new carbureter, larger brake drums, steel bodies, and increased gasoline capacity. All the 1912 models will be of the enclosed front type.

The E-M-F Company plants of the Studebaker Corporation start this week a series of systematic gatherings of dealers which will be on a larger scale than anything in the history of the industry. The company has invited every one of its 1,800 retailers to visit the factory for two days, making the trip at the company's expense and being its guests while in the city. The visits will be made under the auspices of the various branch managers, dealers tributary to the branches at Atlanta, Ga., and Birmingham, Ala., being selected to open the series.

It is the aim of the Studebaker Corporation to become thoroughly acquainted with its dealers and to familiarize the dealers with the manufacturing processes by this method. The visit of the dealers and the arrangements for entertainment are in the hands of Paul Smith, former assistant general sales manager, who has been appointed sales manager.

The motor car industry is given large credit for the enormous increase which U. S. census statistics show for Michigan, during the past five years. During that period, Michigan's investment in manufacturing increased from $337,894,000 to $583,947,000; salaries and wages paid from $98,749,000 to $153,838,000; and the value of the products less cost of material, from $190,039,000 to $316,497,000.

While the most remarkable strides have been made by Detroit, Flint, Pontiac and Lansing, the state in general has become a hive of automobile activity. In fact, the largest increase in number of plants this year has been chronicled outside the centers mentioned. One of the new factories is that of the Gaylord Motor Car Co. of Gaylord. This city is located well up in the northern part of the lower peninsula. The Gaylord Co. already has experimentary models undergoing tests. A. B. C. Comstock, a wealthy lumberman, is president; John A. Hixon, vice-president; John J. Munger, secretary and J. Lee Morford, treasurer.

Another new Michigan concern is the Michigan Adjustable Hub Co., of Bay City, which has started the manufacture f a boltless, adjustable wheel, said to be capable of withstanding a load of 43,000 pounds. The company is investing heavily in machinery and its product will be a simple job to assemble, when the automatic machinery has done its work.

A local change of note is the increase of the capital of the Automobile Manufacturing & Engineering Co., of Detroit, from $1,000 to $50,000.

It is announced from the local headquarters of the General Motors Co., that the New York Stock Exchange had granted an application for the listing of the company's stock. Similar arrangements are being made in Boston. The first transaction on the New York exchange, in the stock was the sale of 100 shares at 51 1-2.

The new plant of the Continental Motor Co. is about ready for the installation of machinery. It has been definitely decided that the Detroit factory will be made its general headquarters and the officers, who have formerly been attached to the plant at Muskegon, are now removing their families to Detroit.

The Abbott Motor Car Co. has established a Detroit branch in the new Dodge Building, placing E. C. Thompson of the factory sales organization in charge. A service department will be attached.

The Regal Co. announces that, some time in the near future, one of the firm's underslung "Twenties" will leave Detroit to establish a speed record between this city and Chicago, and return. It is planned to make the affair a non-stop run, as well as a speed demonstration. The car will be driven by L. J. Wilcox, race driver, and will carry C. B. Sims of the Regal advertising department. A trial trip was recently made to acquaint the driver with the road and the conditions which will be encountered.

The Wolverine Automobile Club is prosecuting an energetic campaign of road posting. The club's commitee, in an Everitt "30" loaned by the Metzger Co. for the purpose, has already posted both the main routes between Detroit and Toledo and is now at work on the main-traveled route between Detroit and Port Huron. The work will be prosecuted through the season, the next routes to be posted being Detroit to Saginaw, and Detroit to Chicago, the last-mentioned highway being by way of Battle Creek and Kalamazoo. Signs of 1-inch lumber are used, black background and a large white arrow pointing the main highway. The name of the city toward which the route runs, is tacked to each sign in copper letters. Through the courtesy of the Michigan Bell and Home Telephone companies, the Wolvering Club's committee has been able to make use of telephone poles for nearly all its signs. This has greatly facilitated the work of posting.

In a recent address on "The Future of the Automobile Trade"

President Hugh Chalmers of the Chalmers Motor Co. stated it as his belief that 1912 would be a most prosperous year for the industry. He saw but one danger—that of over-production, and urged fellow manufacturers to make careful estimates of the demand before forming their plans for the year. Mr. Chalmers called especial attention to the export trade and believes that the demand for medium-priced American-made cars from abroad will continue to increase. In his belief the future of the industry lies largely in thoroughly standardized cars of this type.

The Packard Motor Car Co. received news several days ago of the successful completion of a transcontinental trip by one of its 3-ton trucks. The start from New York was made July 8 and the finish at San Francisco took place Thursday, August 24. The trip was uneventful until the territory west of Omaha was reached, after which encounters with weak bridges, deep fords, mountains and deserts made it one of great difficulty. E. L. Burnett, of Detroit, drove the car. With him were W. T. Fishleigh and Arnold Hainer.

The Warren Motor Car Co. announces the establishment of a London agency with the firm of McCurds & Co. A representative is also arranging for a retail dealer in Paris.

## Crude Rubber Holds at Lower Level

AKRON, O., Aug. 28—Crude rubber prices remain lower than they have been for several years, and indications are for modifications in tire prices for the new season. A steady decline in crude rubber quotations has been noticed for nearly three years, ranging from a high point of $3.00 a pound, to "dollar rubber," which was the rate recently. The present rate of about $1.20 is considered by local manufacturers to be likely to continue, and they declare that in all probability there can be no return to the former high prices of the crude product.

The high rubber price is credited by local manufacturers directly to London and Brazilian attempts to corner the crude rubber market. When Brazilian jobbers and producers combined to raise prices by withholding rubber from the market, and at the same time borrowed money from the Brazilian government on what they stored, American manufacturers bought as little as possible, and fought the combine as hard as they could, even at the expense of their own ability to turn out orders, and the corner finally broke. The slump has been steadily continued ever since.

## Baltimore Dickering for Last Toll Road

BALTIMORE, MD., Aug. 28—A meeting of citizens of Baltimore was held in Mayor Preston's office to determine upon a price, if possible, for the purchase of the tollgate on the Reisterstown Turnpike, near the Park Heights avenue entrance of Druid Hill Park, the only tollroad remaining within the city limits. At the conclusion of the discussion Mayor Preston asked the directors of the turnpike company if they would accept $70,000. They said that they would recommend the acceptance of $75,000, $5,000 less than they asked the Good Roads Commission and $15,000 more than the Commission offered.

Before saying the city would consent the Mayor persuaded the directors to let the city examine the company's books. This will be done by experts. In the event of a disagreement between the city and company abutting property-owners present offered to donate enough land to build a road parallel to the toll road so that the city would have an outlet in that section without using the toll road.

## Quaker Trade Meet Postponed a Week

PHILADELPHIA, Aug. 28—Originally scheduled to take place on Saturday, September 16, the date for the race meet to be conducted by the Philadelphia Automobile Trade Association has been set forward a week and will be held at the Point Breeze track on Saturday, September 23, two weeks previous to the Fairmount Park Road Race.

By postponing the event a week not only will the meet attract a greater number of fast cars but also a larger list of the best drivers, for the originally-selected date conflicted with the meet to be held at Syracuse, N. Y., many noted machines and drivers being entered in that event. The Trade Association's original application to the American Automobile Association for sanction to hold races on September 16 had been granted, and to-day the necessary permit for a change of dates was received by Secretary J. H. Beck.

## Lu Lu Temple Club Will Run

PHILADELPHIA, Aug. 28.—On Saturday, September 16, the recently organized Lu Lu Temple Automobile Club will conduct its initial social run, the objective point being Atlantic City. In addition to souvenirs to be presented each car entered before the Saturday preceding the run, special trophies will be awarded cars finishing nearest to the secret time schedules, the latter to be determined by the usual method—two secret guesses to be made, sealed until completion of the event, opened and the two times added together and divided by two, the result being the allotted time, the winners to be the cars finishing nearest to it. While in Atlantic City cars will be parked on Young's Pier. A large and representative list of entries has already been received, insuring a successful affair.

## Anderson Memorial Road to Be of Service

BRETTON WOODS, N. H., Aug. 28—Within less than a month there has been subscribed to the John Anderson memorial road which is to be built in New Hampshire just $16,500. The Bretton Woods Company subscribed $5,000 and the remainder was added by motorists who knew the late Mr. Anderson personally. Under the plans now worked out the boulevard will be about 25 miles long and connect Crawford and Franconia notches. There were six grade crossings on the first plan, but a new route has been selected so that there now will be but one railroad crossing in the entire route. State Engineer Hill has gone over the route and all the officials connected with his department are enthusiastic over the road.

## Fine Cup for Winner at Columbus

COLUMBUS, O., Aug. 28—Arrangements for the 200-mile automobile race to be held September 3 under the auspices of the Columbus Automobile Club, are rapidly maturing. The Hotel Hartman will give a handsome cup to the winner of the contest. The cup is 20 inches in height, bears two winged wheels and is a model of beauty. The club has contracted for three tons of calcium chloride to keep down the dust on the track. Entries for the event are coming in rapidly and it is believed there will be more than a dozen starters.

## Transoceanic Balloon Finished

AKRON, O.—The gas bag for the balloon with which Melvin Vaniman will try to fly across the Atlantic in October, has been completed at the factory of the Goodyear Tire & Rubber Co. and will be shipped next week.

The gas bag alone weighs two tons and a special flat car is used for its shipment, in a box 30 feet long by 6 feet wide.

## Gimbel Buys Score of Trucks

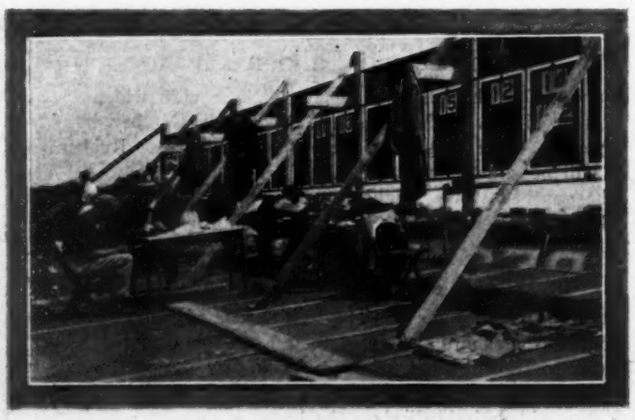
CLEVELAND, O., Aug. 28—The White Co. of Cleveland, Ohio, announces the sale of twenty of their 1,500-pound motor delivery wagons to Gimbel Bros. of New York City. Also the sale of five of these cars to The Hub clothing store of Chicago—these five cars will entirely displace the horse equipment now in use.

# Records Fall at Elgin Stock Races

(*Continued from page* 340.)

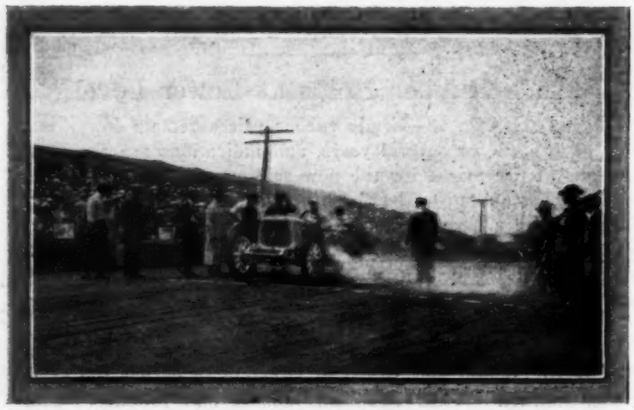
which in turn had a lead of 9 seconds over the Wishart Simplex. Grant was in fourth place, 14 seconds behind Wishart, with Mercer, the Hartman Alco, the Lee Alco and the Pope-Hartford following in the order named. In the fourth lap the Wishart Simplex moved into second place, 58 seconds behind the flying Mulford, Zengel dropping back to third place and Grant retaining fourth, the other quartet retaining their respective positions. The fifth circuit saw the Wishart Simplex, which had been making a strong bid, bowled out, the trouble being a burnt-out connecting rod bearing. As a result of the Simplex's withdrawal, Zengel once more swung into second place, 1 minute 18 seconds behind Mulford, who was still continuing his record-breaking performance, as laps in 7:14, 7:19 and 7:18 will indicate. Grant in Alco No. 1 moved up in third place, 20 seconds behind Zengel, with Hughes in the Mercer following 40 seconds behind and the Hartman Alco 13 seconds behind Hughes. The sixth, seventh and eighth rounds brought no change in the relative positions of the seven remaining contenders, although at the conclusion of the latter circuit Mulford had so consistently added to his advantage that he was now but 2 seconds short of being a full 2 minutes ahead of his nearest rival. Zengel in National No. 2. The latter was 61 seconds ahead of the Grant Alco, which in turn had almost 4 minutes' advantage over the Mercer. The Hartman Alco was about 1 1-2 minutes behind the Mercer with the Lee Alco and the Pope-Hartford far behind, and, barring accidents to the leaders, out of the race.

The Lozier's remarkable work in the first 8 rounds exemplify the old adage that the race is not always to the swift, for the big white car limped into the hospital just short of its ninth round and the announcement was megaphoned that the car was permanently out of the race with a broken connecting rod. This put the Zengel National into the lead by a margin of 1 minute 16 seconds over the Grant Alco and the huge crowd of spectators, deprived of the hope of a second win for Mulford, settled back comfortably in the belief that there would be furnished a heart-breaking contest between the two leaders. At this point the Mercer was trailing along in third place, but 42 seconds behind the Grant Alco, followed in turn by the Hartman Alco, which was 23 seconds in the rear and by the Lee Alco and the Pope-Hartford, the latter being over one-half hour behind. From the tenth to the sixteenth laps there was little to vary the monotony of the grind with the exception that Alco No. 7, which had been trailing along in fourth place, moved up to third in the twelfth round and maintained its position during four circuits. The sixteenth round saw the Mercer, which had been held up at the pits on two occasions for refilling and tire changes, regain third place, but it was nearly 4 minutes behind the Grant Alco, which was second, a trifle over 2 minutes behind the leader. The seventeenth, eighteenth, nineteenth and twentieth round saw no change in the relative positions of the six contenders, the conclusion of the last-named circuit showing Zengel to be 2 minutes 12 seconds ahead of the Grant Alco, with the Mercer in third place over 4 minutes behind, and the Hartman Alco a bad fourth, the latter having been delayed by a leak in the gasoline line, which compelled its withdrawal in the next round. The Lee Alco was plugging along in fifth place and Buck in the Pope-Hartford was plodding along doggedly many miles behind.



The "men behind the score-board" saw little of the races

On the twenty-first lap the Zengel National made its first stop, having gone over 177 miles without a let up. The stop, however, was a short one and after filling with gasoline, Zengel was away amid the cheers of the huge crowd, but with a loss of a full minute to the fast flying Grant, the margin now separating the two cars being but 1 minute 21 seconds. The Mercer, was, at this point, over 4 minutes behind the Grant Alco but still in third place. The crowd began to hope for the National-Alco duel which the inforced withdrawal of Mulford's Lozier had seemed to portend. The twenty-second lap, however, saw Grant lose all the advantage he had gained by Zengel's stop, with another minute added to the handicap that he would be compelled to overcome in order to catch the leader. Grant stopped for gasoline and water, the filling of the latter being rendered somewhat slow owing to the high pressure in the radiator, the force of the steam blowing the water aside and preventing rapid filling. This was really the deciding point in the race for first place, for barring the possibility of stops on account of tire trouble Zengel's lead was sufficient to enable him to play it safe to the end of the race, although, as it happened, he consistently out-drove Grant, in all but the very last lap, when, with the prize practically in his grasp, he negotiated one of the slowest laps of the entire thirty-six, barring, of course, those in which he was compelled to stop for supplies. These were in the twenty-first lap, as above mentioned, and again in the thirty-second lap, on both of which occasions the crew at the pit performed their work in jig time. Grant's second stop—for gasoline and water—also in the thirty-second round, gave a comparison of the working of the two pit crews, the National outfit showing a sprightliness that cast the efforts of the Alco contingent into the shade, although the fact that the Alco had to take on water in addition to the gasoline was what really caused the delay.



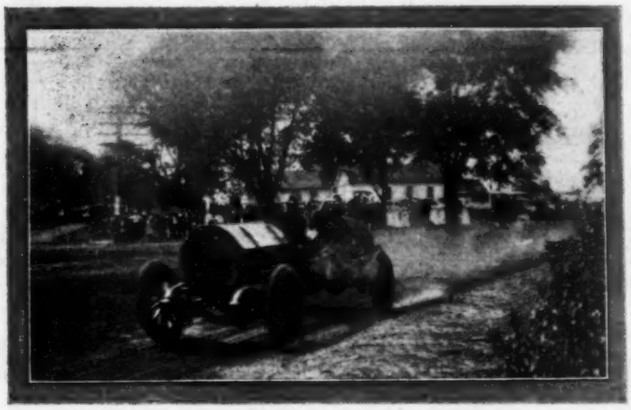
The Lozier was the last to start in the Elgin Cup race, but was soon breaking the record on every lap

The first position settled, barring accidents, the race for second place between the Grant Alco and Mercer No. 9 now attracted the attention of the spectators. When Grant made his long stop in the thirty-second round Hughes saw his opportunity and at the close of that lap he had almost closed up the gap which separated his car from second place, Grant's margin of lead being but 24 seconds. This was still further reduced in the thirty-third round to 16 seconds, increased to 17 seconds in the

thirty-fourth lap and reduced to 12 seconds at the conclusion of the thirty-fifth circuit, the next to the last of the race. The sympathies of the crowd seemed to be with Hughes in the Mercer, his brilliant victory of the preceding day having made him a general favorite. The Alco, with its excess of power, was enabled, however, to hold the Mercer safe and although the latter covered the last lap a second faster than its rival, it was unable to close up the gap, a matter of but about 11 seconds separating the two cars at the finish. Alco No. 5, which had met with a variety of troubles throughout the race, was still running at its conclusion, having covered thirty-two of the thirty-six laps—about 272 miles.

## What Happened at the Pits

An hour before starting time on the first day of the Elgin National Stock Chassis Races, the racing cars entered in the Illinois, Kane County and Aurora cup events began to line up opposite their respective pits, where they immediately were seized upon by the technical committee for the final examination.



Alco, No. 5, which finished fourth in the big race, and was still running at its close

This examination was not a fruitless one, for several of the cars appeared for the start with ignition wires and gasoline pipes taped in a very much more substantial manner than was customary in the regular stock chassis construction. All of these extra precautions counted for naught, for this tape had to be removed, much to the chagrin of the drivers and mechanicians.

Herein lies one of the many benefits to be obtained from stock car racing. The weaknesses will out, and the maker, if he be a conscientious one, will profit by his experience and strengthen not only his racing cars but those which he sells to the public as well.

At 10:40 a. m. nineteen out of the twenty-three cars entered in the three events, were lined up near the tape in the order of their start. The three Falcars entered had not even shown up for practice and the Cino No. 26 had been disabled in practice the day before.

Promptly at 11 o'clock, the first car was sent off by Starter Wagner. This was the National No. 1, with Donald Herr at the wheel. The rest of the cars entered in the 203-mile Illinois Cup and 169-mile Kane County events followed at intervals of 15 seconds; and 15 minutes later the cars entered in the 135-mile Aurora Cup contest followed.

The last car hardly had left the tape when the first halt was made at the pits, Robillard in a Staver stopping for a tire. Half a minute later Jeffkins in a Velie also stopped for a minute at his pit for a tire and water; and four minutes after he had gotten away Gaston Morris (Cole No. 21) drew up to the pit for a tire. It was evident that these drivers were pushing their mounts to the limit, as each of the trio required a new tire at the end of the first lap.

At the end of his second lap Rainey, who was driving Burt's Cino car, stopped at the Cino pit to exchange an injured tire, which had been replaced on the road, for a fresh one. The Velie driven by Stickney was the first to suffer mechanical trouble, at the end of the third lap a stop of 12 minutes was made during which time Stickney replaced a couple of pushrods that had become stuck in their guides; while the mechanician worked on the hand oil pump, which had broken. While these repairs were being made, Armstrong in his Colby stopped for 4 minutes to replace a reinforcement bolt that had been lost from the engine gearcase. The sleeve that is used inside of the case had dropped down into the case and was rattling around harmlessly, but considerable oil was being lost through the bolt holes. For the want of an extra bolt, the holes were plugged with wood and the car again sent on its way. As Armstrong drew away from his pit, Ogren in another Colby coasted past and brought his car to a stop about 100 yards beyond the repair pits, where it was left throughout the race. There had been a leak in the oil supply and the pistons had seized in the cylinders for the want of sufficient lubricant.

The Staver, driven by Monckmeier, was brought to a halt at the pits at the end of the fifth lap, so that the auxiliary oil tank which had been broken could be removed, and water taken on. For the want of oil, the motor had become so hot that when the radiator cap was loosened it shot up into the air, and water and steam spouted from the radiator. In four minutes, however, the little car again went on its way.

Armstrong's Colby was again brought to a stop at the pits at the end of the seventh lap. At this time 9 minutes were lost. The nut from the right rear spring shackle had been lost, and was being replaced by the driver, while the mechanician was sent down the course to take a bolt from the engine gearcase of Ogren's disabled car. Having replaced the lost engine bolt and fitted a new bolt in the spring shackle the car was again ready except for the want of oil to replace that which had been lost through the bolt holes in the engine gearcase. It happened that the pit attendants had neglected to put in an extra supply of oil and after several minutes' delay the car started off without it.

Jeffkins' Velie stopped at the pits for the second and last time on its eleventh lap, to take on oil and adjust the carbureter. Two minutes were required to do the work. Fifteen minutes later Stickney stopped for 9 minutes to replace a couple more valve tappets, and take on water and gasoline.

After making six more laps on a diminished supply of oil in the motor, Armstrong brought his Colby to a stop in front of the pit. A supply of oil had been obtained, but when an effort was made to pour it into the tank the tires were in the way and no funnel was at hand, the result was that half the oil was poured on the ground and the tires, and half into the tank. The motor was so stiff from running so long without sufficient lubricant that the mechanician could not crank it; but a husky pit attendant managed to do this and car was again in the race after a delay of four minutes. That the Colby company is new in the racing game was very apparent; too much

MICHELIN TIRES BEST FOR SPEED AND ENDURANCE
LOZIER-WINNER 1910 ELGIN NATIONAL CHAMPIONSHIP
BOB BURMAN, WORLDS SPEED KING
RAY HARROUN, SPEEDWAY CHAMPION
AND MANY OTHER FAMOUS RACING DRIVERS USE THE
REMY MAGNETO

The press stand and score-board facilities were complete in every respect

National No. 1, winner of the Illinois Cup, rounding Hoornbeck's Corner

was left to Pearce, the driver of the third Colby entry, who had his hands full during the race in bringing his car into third place at the finish. A much better showing might have been made by the other Colby entries had it not been for the inefficiency of the repair pit management and equipment.

The last stop made at the pits was made by Robbins' Abbott-Detroit, and was due to a lost magneto coupling.

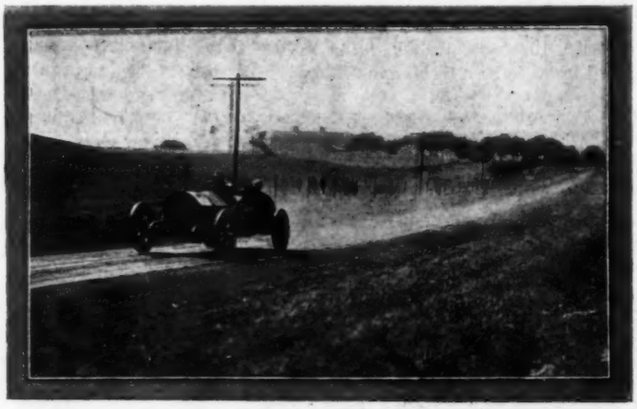
## The Pits on the Second Day

With one or two exceptions, there was considerable more snap to the work of the pit attendants during the big race pulled off on the second day. Johnny Aitken's National was the first of the big cars entered in the Elgin Cup event to stop at the pits, and this was at the end of the first lap. The auxiliary air-valve spring of the carbureter seemed to be at fault, for it was replaced by a new one, while Johnny fussed around the pit, threatening to quit at once. In three minutes, however, the carbureter was repaired and away he went.

The next stop was made by Buck in a Pope-Hartford to take on a fresh tire in place of one which had been replaced on the road. Less than a minute was required to make the change. This was just the start of considerable tire trouble for Buck, which eventually caused the death of both Buck and Jacobs, his mechanician.

After making two laps in excellent time Ralph DePalma's Simplex was silently brought to a stop at the side of the road at the approaching end of the pits. The engine had been stopped some distance up the road and the car had simply coasted down to the grandstand where it was left by the roadside. The flywheel had broken. At the end of the fourth lap Buck again brought his Pope-Hartford to a halt at the pits for another tire and to remove the speedometer shaft which was broken off when the tire of the right front wheel came off. A few minutes later Johnny Aitken's National rolled up to the pits, then backed off onto the side ot the road behind DePalma's disabled Simplex; the rear cylinder was cracked.

Buck stopped again on the seventh lap to take on another tire,



The Mercer (Hughes) burning up the backstretch at a 65-mile clip

and five minutes later Ralph Mulford's Lozier rolled down on the side of the road behind Aitken's National. A connecting rod bearing of the front cylinder had been burnt out, the rod had been broken and had pushed a great hole in the crankcase, the

**TABLE SHOWING POSITION OF THE CARS AT THE CONCLUSION OF EACH LAP DURING THE FOUR ELGIN RACES**

**AURORA TROPHY.**

| No. | Car. | Lap 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 | Abbott-Detroit | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 32 | Ford | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 33 | Abbott-Detroit | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

**ILLINOIS TROPHY.**

| No. | Car. | Lap 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | National | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | National | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 2 | Velie | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | | |
| 4 | Velie | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | | | | | | | |

**KANE COUNTY TROPHY.**

| No. | Car. | Lap 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | Mercer | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | Mercer | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 26 | Colby | 7 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 24 | Cole | 2 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 14 | Corbin | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 7 | 7 | 7 | 7 | 7 | 6 | 5 | 5 | 5 | 5 |
| 21 | Cole | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 |
| 27 | Staver-Chicago | 6 | 4 | 4 | 4 | 4 | 8 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 |
| 22 | Colby | 9 | 9 | 11 | 11 | 11 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 11 | Cino | 4 | 7 | 8 | 8 | 8 | 7 | | | | | | | | | | | | | | |
| 25 | Staver-Chicago | 10 | 10 | 9 | 9 | 9 | 9 | | | | | | | | | | | | | | |
| 18 | Colby | 11 | 11 | 10 | 10 | 10 | | | | | | | | | | | | | | | |

**ELGIN TROPHY.**

| No. | Car. | Lap 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | National | 3 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | Alco | 5 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 9 | Mercer | 7 | 7 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 5 | Alco | 8 | 8 | 7 | 7 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 3 | Pope-Hartford | 9 | 10 | 8 | 8 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | | | | | | | | | | | | |
| 7 | Alco | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | |
| 12 | Lozier | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Simplex | 2 | 3 | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Simplex | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | National | 10 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

oil had been lost, and the motor was running spasmodically from the overheated condition with the ignition cut out. The great race was hardly started, and three of the most prominent cars were out of it.

After succeeding in making four laps without stopping at the pits for tires, Buck came up to the grandstand at the end of the eighth with the right rear tire dangling from the axle. Three minutes elapsed before the old tire was removed and a new one replaced. By this time the Pope-Hartford pit had used up all of its extra tubes, and the team manager was kept busy borrowing tubes from officials and others having spare tubes in their cars of the required size.

Frank Lee's Alco made its first stop at the pits on the eleventh lap; two right rear and one left rear tires had been replaced on the road and the stop was made to take on a fresh supply. There also was some trouble with the hand oil pump so the piston was removed and the cylinder plugged with a cork. After replenishing the water supply in the radiator, the car was again put under way; three minutes' time having been lost. Harry Hartman's Alco made its first stop at the pits at the end of the fourteenth lap, and two rear tires were changed and water administered to both the crew and the car.

Buck, who was finishing his twelfth lap, made the next stop to take on a tire. A few minutes later Hartman again drove up with his Alco to take on oil and gasoline, change a left rear tire, and replace a spark plug lead that had become disconnected. This caused a delay of four minutes.

There was considerable excitement in many of the pits when Len Zengel in the winning National drove up to the pits for the first time at the end of his twenty-first lap. He did not tarry long, however, for in half a minute he was again on his way. At no time could it be said that the pit attendants of the National outfit were lacking in agility, but on this occasion they certainly exhibited some speed.

Frank Lee's Alco drew up to the pits on its eighteenth lap for

Line-up at the start of the Illinois Cup race on the first day

oil, water and gasoline, and to replace the left rear tire; and during the four minutes consumed Harry Grant also brought his car to a stop for the first time during the race. The stop lasted for but a minute and a half, during which time gasoline and water were taken on. Even this, however, was rather poor service on the part of the pit attendants, for it took the National but one-half minute to take on gasoline, water, and oil as well At the end of his sixteenth lap Buck made another stop for oil, gasoline and tires.

Hughie Hughes, whose little Mercer had been running like a watch, stopped at the pit for the first time at the end of the twenty-first lap for gasoline, oil and water. Lee's Alco stopped for one minute on the twenty-fourth lap to replace the left rear tire.

At the end of the thirty-second lap Len Zengle brought considerable joy to the hearts of those in the Alco pit by bringing his car to a stop at the National pit for the second time. Their joy was short-lived, however, for in less than forty seconds he was off again with a fresh supply of gasoline, and five minutes later Grant called a halt of one minute to change right rear and left front tires.

## Equipment of the Racers

The following table, showing the equipment of the various contesting cars as regards carbureters, magnetos, tires, etc., will be found interesting:

| No. | Car | Carbureter | Magneto | Ignition System | Tires |
|---|---|---|---|---|---|
| | | **ELGIN NATIONAL TROPHY** | | | |
| 1 | Alco | Gray | Bosch | Single | Michelin |
| 2 | National | Schebler | Splitdorf | Double Dis. | Michelin |
| 3 | Pope-Hartford | Pope-Hartford | Bosch | | Racine |
| 4 | Simplex | Simplex | Bosch | Double Dis. | Michelin |
| 5 | Alco | Newcomb | Bosch | Double Dis. | Michelin |
| 6 | National | Schebler | Splitdorf | Double Dis. | Michelin |
| 7 | Alco | Newcomb | Bosch | Double Dis. | Michelin |
| 9 | Mercer | Schebler | Bosch | Double Dis. | Michelin |
| 11 | Simplex | Simplex | Bosch | Double Dis. | Michelin |
| 12 | Lozier | Rayfield | Bosch | Double Dis. | Michelin |
| | | **KANE COUNTY TROPHY** | | | |
| 11 | Cino | Stromberg | Remy | Double Dis. | Michelin |
| 12 | Mercer | Schebler | Bosch | Double Dis. | Michelin |
| 14 | Corbin | Miller | Bosch | | Michelin |
| 15 | Mercer | Schebler | Bosch | Double Dis. | Michelin |
| 18 | Colby | Rayfield | Remy | Double Dis. | Michelin |
| 20 | Colby | Rayfield | Remy | Double Dis. | Michelin |
| 21 | Cole | Schebler | Bosch | | Michelin |
| 22 | Colby | Rayfield | Remy | Double Dis. | Michelin |
| 24 | Cole | Schebler | Bosch | Dual | Michelin |
| 25 | Staver-Chicago | Rayfield | Remy | Double Dis. | Michelin |
| 27 | Staver-Chicago | Rayfield | Remy | Double Dis. | Michelin |
| | | **ILLINOIS TROPHY** | | | |
| 1 | National | Schebler | Splitdorf | Double Dis. | Michelin |
| 2 | Velie | Rayfield | Remy | Dual | Michelin |
| 3 | National | Schebler | Splitdorf | Double Dis. | Michelin |
| 4 | Velie | Rayfield | Remy | Dual | Michelin |
| | | **AURORA TROPHY** | | | |
| 31 | Abbott-Detroit | Mayer | Bosch | Single | Michelin |
| 32 | Ford | Kingston | Ford | Single | Michelin |
| 33 | Abbott-Detroit | Mayer | Bosch | Single | Michelin |

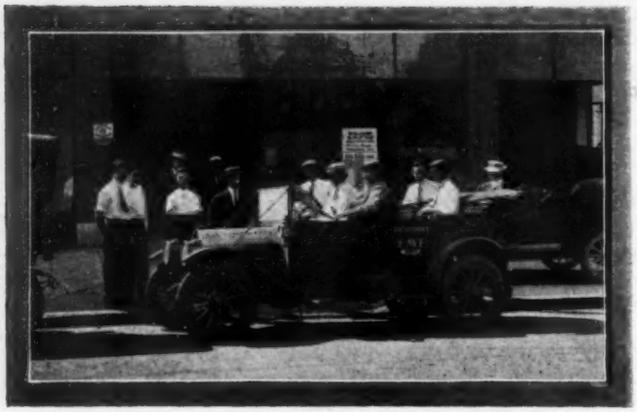
## Worcester Dealers Ready for Show

WORCESTER, MASS., Aug. 28—The second annual summer automobile show of the Worcester Licensed Dealers' Association will be held September 4, 5, 6 and 7, under two large tents at the New England fair grounds at Greendale in connection with the big annual agricultural event of this section of the country.

The show, besides embracing many of the leading 1912 models, will have spaces for exhibiting all sorts of accessories and supplies. The cars to be exhibited this year by the members of the Worcester Licensed Dealers' Association, will include Overland, Stanley Steamer, Winton, Cadillac, Maxwell, Rambler, Columbia, Thomas, Everett, Hudson, Elmore, National, Chalmers, E-M-F, Flanders, Mitchell, Stoddard-Dayton, White Gasoline, White Steamer, Velie, Knox, Franklin, Stearns and possibly the Chadwick, Packard, Buick and Regal, along with the following trucks: Gramm, White and Rapid.

The committee in charge of this year's automobile show is Henry J. Murch, chairman; LeRoy Leighton and William Carpenter.

The second line of Illinois Cup contenders, with the Kane County cars in the rear



Pilot Dai H. Lewis in the E-M-F pathfinder as he finished laying out the route for the second annual tour of the Automobile Club of Buffalo

# Thirty in Buffalo Tour

BUFFALO, N. Y., Aug. 28—Present indications are that at least thirty cars will start in the Second Annual Reliability Tour, to be run September 6-9, under the auspices of the Automobile Club of Buffalo, for the Laurens Enos and other trophies.

The pathfinding work for the tour was completed on August 19th, under the direction of Dai H. Lewis. An E-M-F "30" was assigned as the official pathfinder and pilot car for the contest and was driven over the 800-mile course by George Meinzinger, another skillful driver of Glidden tour fame.

Following the precedent of last year, each day's run of 200 miles will start and finish in Buffalo. The technical end of the event will be in charge of the Contest Board.

The course thoroughly covers western New York from Lake Erie to Lake Ontario, and embodies elements most ideal for a reliability contest. The Laurens Enos trophy was won last year by Charles F. Monroe, Buffalo representative of the United States Motor Company, in a Maxwell. Mr. Monroe has entered four cars in this year's event to defend the cup.

## Two-Day Meet at Brighton Beach

Two days of racing will be served up to the metropolitan public Saturday, Sept. 2, and Labor Day, Sept. 4, at Brighton Beach, under the direction of E. A. Moross. The program shows nine carded events for each day for cars eligible to compete in the "open" classes.

Besides the Moross string there will be several local entries and the sport promised is on a par with that offered at other meets under the auspices of the same promoter. The promised 24-hour race faded away Wednesday when it was announced by the Contest Board that application had been made by Guttenberg promoters for the Sept. 30 date. As this was the date tentatively selected for the long grind, the chances of holding the race are considered very slim.

Previously it had been announced that the promoter of the "twice-around-the-clock" event had secured nine entries and had the choice of two more.

## Good Fields in Fernbank Road Races

CINCINNATI, O., Aug. 28—The Fernbank Dam Road Races to be held Sept. 9 as the culminating feature of the celebration marking the opening of the government dam below this city are attracting country-wide attention. During the Elgin meeting a committee from Cincinnati was busy canvassing the contestants for entries in the quartette of races to be run here.

It was announced that the committee had been successful to a certain degree and that the fields would be fair in each of the races. Southern Ohio is a big manufacturing field and entries from the local factories at Cincinnati and nearby have been promised. The cars will race under Class C limitations.

## Next Week Most Important of Year

Next week will be one of the most important of the year in several particulars as applied to the automobile industry. In a sporting way there will be six race meetings, a road race, hill-climb and an endurance run, which is certainly the high-water mark of the year as far as contest work is concerned. But in a much wider sense, the conferences of the governing bodies of the industry which will be held in New York City are of vastly more import to the trade than the contests.

When the Automobile Board of Trade assembles, the roster of the Madison Square Garden show will be framed. Applications for membership in the organization will be received and acted upon and, after the conclusion of the meeting, the names of those who will exhibit at the show will be known.

The N. A. A. M. also holds one of the most momentous meetings of the season, at which the list of members will be increased and a number of details with regard to both the big National shows will be threshed out. The Manufacturers' Contest Association will meet to act upon the recommendations suggested to its membership at the recent Detroit session of the committee on rules.

The meetings of the A. B. of T. and the N. A. A. M. will be the last at which memberships can be granted this Fall so as to allow participation in the annual shows. The drawings for space will take place shortly afterward and those who wish to show at either of the exhibitions are hustling to get their applications in.

Besides these things the organizations will take up a vast mass of other detail work.

On the meeting of the M. C. A. depends the future of contests and it is quite apparent that there is a division of opinion as to a number of major matters in this class.

## Stock Cars Only in Glidden Tour

The following official correction of the conditions under which the Glidden Tour will be run in October, has been issued by the Contest Board:

"Owing to a misunderstanding of the action of the Manufacturers' Contest Association, taken at the Detroit meeting, August 10 and 11, in reference to the registration of stock cars of private owners in the 1911 Glidden Tour, the supplementary regulations heretofore issued waiving registration requirements are hereby cancelled and registered stock cars only will be eligible to compete for the Glidden trophy and for the cash or plate prizes in the seven price divisions."

The following new entries have been received: J. R. Sandlin, Jasper, Fla., Cadillac; R. D. Drysdale, Jacksonville, Cadillac; Hoke Smith, Atlanta, Maxwell; Studebaker Corporation, three E-M-F's and the McIntyre Company, Auburn, Ind., McIntyre. With these additions the list now contains twenty-six entries.

## Flyers Enter Old Orchard Meet

With the speedy Jackson racer that made such a good showing at Indianapolis Cobe has entered the open events to be decided at the beach meeting scheduled to take place at Old Orchard, Me., Sept. 4, 5 and 6. A Pope-Hartford car handled by Disbrow will also be featured on the sands. Besides these special racers it is expected that some creditable fields will face the starter in the class events. These will probably include a pair of Oaklands, three Camerons, an Atlas, two Buicks and three Velies. There may be some others as well.

## Hartford to Have a Race Meet

HARTFORD, CONN., Aug. 28—The final day of the State Fair will see an automobile race program decided at Charter Oak Park. Ralph De Palma, with a big Simplex, is carded as the free-for-all star and in addition there will be a number of local entries in the class events.

## Ohio Farmers Inspect Models

COLUMBUS, O., Aug. 28—One entire building devoted to the display of automobiles was set aside by the Ohio State Board of Agriculture at the annual Ohio State Fair which is being held this week. It is the first time in the history of the fair that there has been such an extensive display of motor cars and the building was crowded.

The building was reserved for automobiles because of the demands of the farmers of the State that they be permitted to see the latest models of motor cars without leaving the fair grounds. Dealers in Central Ohio as well as factories soon realized the importance of the display and many applications for space were received by the board of agriculture. All of the exhibits were in place by 8 a. m., to-day.

The exhibits were arranged on platforms after the manner of automobile shows. Most of the exhibits are made by the dealers in Central Ohio, although a number of factories sent displays under the charge of their factory men. In all 67 cars were on exhibit which were distributed principally among the medium priced cars. One of the features of the show was the large exhibit of E-M-F cars. The Buick and Mitchell displays also attracted considerable attention. Other makes shown were the Elmore, Jackson, Overland, Zimmerman, Warren-Detroit, Abbott-Detroit, Maxwell, Columbia, Republic, Sampson, Brush, DeTamble, Liberty Brush, Ford, Hupmobile, Speedwell, Empire and others.

## St. Louis to Hold Early Show

ST. LOUIS, Aug. 28—Definite announcement of plans for the open air show to be held Oct. 2 to 7, has been made by the St. Louis Automobile Manufacturers and Dealers' Association. The association believes that in addition to this being the first time an open air show has been attempted on a large scale, it will also mark the first extensive display of 1912 models in this section.

The exhibit is to be held at Forest Park Highlands, an amusement resort, where there is available 60,000 square feet under roof. This is more than twice the space to be had in either the Coliseum or the Armory, where previous exhibits have been held and where there has always been complaint of lack room.

By a system of waterproof curtains all of the space under roof will be arranged so that it can be closed in if there is bad weather. The show will not be open to cars which are not represented in St. Louis by agents, but every St. Louis dealer, whether or not he is a member of the association in charge of the affair, will be taken care of by the committee, according to the announcement.

The show is to include separate displays of motor trucks and delivery wagons and of electric pleasure cars. Plans for decoration now under way provide for carrying out the idea of a forest scene, with tree trunks, bark and autumn leaves used in profusion.

## Boston Figures on Race Meet

BOSTON, MASS., Aug. 28—President E. A. Gilmore of the Bay State A. A. has been in conference with a number of the well-known makers who have racing teams relative to a race meet at Readville this fall. The plans for a meet were first put up to President Gilmore some weeks ago by a prominent promoter, but the Bay State official had his experience a year ago with the Barney Oldfield campaigners, so he was not ready to allow anything else that was not in positive accordance with the contest rules.

Some of the club members thought a race meet would be a good thing and they have been talking it over. One of the members who was going to the Elgin races was asked to talk it over with some of the makers there and see what could be done. The Readville track is recognized as one of the safest in the country and there never has been a fatality there in a motor race meet, and but one accident in its history, and that caused by a couple of cars bumping together, preceding a race, one of them being an outside machine, not supposed to be on the track.

## Hoosiers Active for Good Roads

SOUTH BEND, Aug. 28—The building of the projected boulevard through the heart of Indiana's sand dunes in the northern part of Porter and Lake counties, promises to be followed by agitation in Laporte county for the improvement of the highway running east from Laporte through Rolling Prairie to New Carlisle.

With the improvement of the road from Laporte to South Bend the last link in the proposed automobile roadway from South Bend to Chicago would be completed.

## Port Jefferson Climb Sept. 9

Far and away the most important hill-climb scheduled for this season in the vicinity of New York is the event to be held at Port Jefferson, L. I., Saturday, Sept. 9. Last year the climb proved to be both fast and spectacular and drew a big crowd and a typical entry list. This year the fields will probably be smaller in the stock events but in the special numbers the chances are that they will be larger.

Extensive preparations are being made to provide a well-balanced program with full technical supervision and administration.

# Floral Parade in Iowa

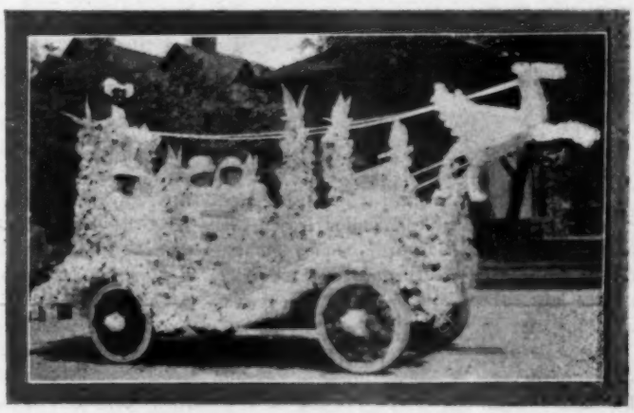
DES MOINES, IA., Aug. 28—Des Moines' second annual Iowa State Fair Automobile Show opened Saturday, with the first automobile parade ever held in Des Moines. Fifty cars, decorated from head lamps to tail lights, were entered in the floral pageant and it was one of the most beautiful sights ever seen in the city. Without doubt the floral parade will be made an annual feature. The local dealers were practically all represented in the parade.

A Cartercar driven by Mrs. Howard Schneider, of Newton, Iowa, was given first prize of $75 for the most beautifully decorated car, while second prize went to the Iowa Automobile Company's Staver car.

The automobile show promises to be one of the big features of the State fair. The space beneath the immense steel grandstand is being used for an exposition hall and 100 cars, representing every dealer in Des Moines, are being shown.

Ray Harroun and the Marmon "Wasp" have been booked as the attractions of the fair and during the week will be pitted in a speed contest against one of the two Wright air men who are at the fair.

Another racer who is here in daily exhibitions is Lou Heineman and his Case car.



Cartercar driven by Mrs. F. Schneider, of Newton, Iowa, winner of the first prize in the Des Moines floral parade

## Hoosiers Seek Modern Fi[illegible] Apparatus

INDIANAPOLIS, IND., Aug. 28—In [illegible] with a policy adopted some time ago of placing motor [illegible]quipment in the fire department, the board of public safet[illegible] will purchase immediately a squad wagon carrying eight pi[illegible]ked men, 250 feet of chemical hose and a 35-gallon chemic[illegible] tank; a ladder truck carrying eight men and 130 feet [illegible] of ladders; a combination hose and chemical wagon and [illegible] a combination pump and hose apparatus to carry 1,000 f[illegible] 500 ga[illegible] feet of hose and capable of pumping not less than Bi[illegible]ons of water a minute.

[illegible]ds are now under consideration for this apparatus and contracts will be let after the board has visited the various factories. At this time the fire department is using a squad wagon, a touring car in which the chief answers alarms and a truck for the fire alarm telegraph system.

In bidding for the proposed apparatus, each company was required to submit blue prints and specifications. The bids under consideration are:

Squad wagon: American La France Engine Co., Elmira, N. Y., $5,500; Knox Automobile Co., Springfield, Mass., $5,600; Webb Motor Co., St. Louis, $4,800; Victor Motor Co., Buffalo, N. Y., $4,185; Harder Truck Co., Chicago, $3,375; Thomas B. Jeffrey Co., Kenosha, Wis., $5,250; Meridian Auto Co., Indianapolis (Packard), $5,277.40; Central Automobile Co., Indianapolis (Grabowsky), $4,200, and Mais Motor Truck Co., Indianapolis, $4,750.

Pump and hose: American La France Engine Co., Elmira, N. Y., size 1, $8,500, size 2, $7,500; Knox Automobile Co., Springfield, Mass., $8,100; Robinson Fire Apparatus Co. St. Louis, $8,000; Webb Motor Co., St. Louis, size 1, $8,500, size 2 $7,450; Victor Motor Co., Buffalo, N. Y., $6,440.

Hose and chemical: American La France Engine Co., Elmira, N. Y., $5,500; Knox Automobile Co., Springfield, Mass., $5,600; Robinson Fire Apparatus Co., St. Louis, $5,500; Webb Motor Co., St. Louis, $5,000; Seagrave Co., Columbus, O., $5,000; Pope Hartford Motor Car Co., Hartford, Conn., $5,000; Victor Motor Co., Buffalo, N. Y., size 1, $4,665, size 2, $4,400; Harder Truck Co., Chicago, $3,375; Thomas B. Jeffrey Co., Kenosha, Wis., $5,500; Meridian Auto Co., Indianapolis (Packard), $5,277.40, and Mais Motor Truck Co., Indianapolis, $4,800.

Ladder truck: American La France Engine Co., Elmira, N. Y., $5,500; Knox Automobile Co., Springfield, Mass., $5,200; Robinson Fire Apparatus Co., St. Louis, $5,800; Webb Motor Co., St. Louis, $4,500; Seagrave Co., Columbus, O., $4,900; Victor Motor Co., Buffalo, N. Y., $4,690; Central Automobile Co. Indianapolis (Grabowsky), $3,800, and Mais Motor Truck Co., Indianapolis, $4,800.

## News Notes from Kansas City

KANSAS CITY, Aug. 28—The Mitchell Lewis Motor Co. is to establish a branch in Kansas City, Aug. 31. The building is located at the southwest corner of Sixteenth and Grand streets, right in the heart of the motor row.

E. J. Kilborn, of the Mitchell factory, is to manage the branch.

The Kaw Valley Auto Co., who represented the Mitchell for three years, has not yet announced what line it would take in place of the Mitchell.

Kansas City is to have a Fall race meet, three days, commencing Sept. 2 and ending Labor Day. Many fast cars have been entered. K. L. Bernard, racing manager for the Automobile Club of this city, left Saturday to endeavor to obtain some of the Elgin contestants.

## Montreal Longs for More Speed

MONTREAL, Aug. 28—A movement to establish certain reforms which mean much to automobile users and dealers is being advocated quietly and will probably take definite shape before the leaves are off the trees. The prime movers hope to see their aims accomplished before the opening of the summer season of 1912. The project has two principal aims. The first, to see the speed limit law for the City of Montreal made to conform with modern ideas and conditions, and second, to have the mountain roads opened to automobiles during certain hours of the day.

F. G. Pennal and Frank Stockwell are the prime movers. If their plans mature, either a new automobile association will see light in this city or The Automobile Dealers' Association, which was brought into being at the time of the motor show last spring, will be galvanized into activity and will take the matter up.

The present speed limit in Montreal is approximately 9 miles an hour.

Drivers of automobiles in Montreal have another vigorous kick coming against existing conditions, in the manner in which the law is enforced. Mr. Stockwell says that speeding at the rate of 20 miles an hour on crowded thoroughfares like St. James street, where anything above 6 miles an hour involves a certain amount of danger, is ignored, simply because the Provincial Government entrusted with the enforcement of the law confines its attentions to boulevards, like Park avenue north.

For hill climbing also Mr. Stockwell says a low speed is undesirable. A car climbing a hill such as Beaver Hall Hill on top gear with small noise, little gas exhaust, causes infinitely less annoyance to pedestrians and householders than a car running up on low gear, emitting smoke and noises, to the irritation of all beholders.

In Toronto, the speed limit is twice as high as it is here, and in Detroit and New York it is higher still. The fact that an automobile may be handled with a much greater degree of certainty and speed than a horse, makes these limits practical in cities where the traffic is at least as congested as it is in Montreal.

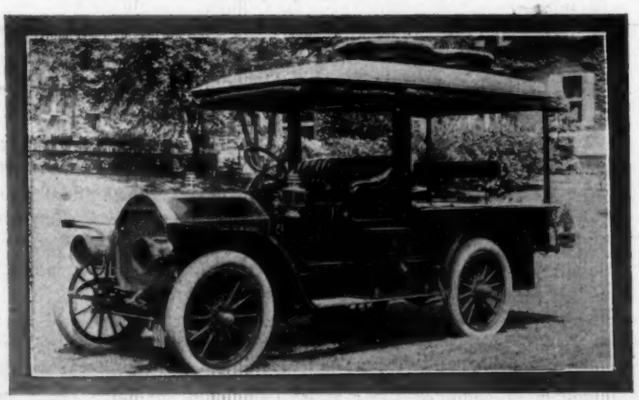
Mr. Pennal is at present engaged in collecting data from all

## Camping Car for duPont

Senator T. Coleman duPont, of Delaware, who recently created a sensation in the motoring world with the announcement of his determination to build a public highway running due north and south through his entire home State, is going ahead with his project.

Col. duPont's purpose is to keep in personal touch with the project and to this end has accepted delivery of a Stoddard-Dayton camping car built under his own plans.

The car is of 45-horsepower on 115 inches wheelbase, with a body specially constructed and so laid out that it has sufficient length inside to accommodate a hair mattress 6 feet long. There are two lockers about 6 inches wide, which run the length of



Stoddard-Dayton camping car specially prepared for Senator T. C. duPont, showing how tents and paraphernalia are placed or built into it

the principal cities in Canada and the United States which will give the organizers of this movement something to draw authoritative comparisons from. At a meeting to be held shortly these data will be considered and the question of re-organizing the old dealers' association or of establishing a new body will be entered into.

In regard to the question of excluding automobiles from the mountain roads, Mr. Stockwell's idea is that the roads should be granted exclusively for the use of horses and horse-drawn vehicles for certain hours of the day. Until three or four o'clock in the afternoon is suggested as the limit, the roads after this time to be open to automobiles as well as to horses.

"As a matter of fact," Mr. Stockwell declared, "a man might drive a week around the island and not meet a horse that was frightened at automobiles. In the old days it was the exception to meet a horse which was schooled to auto traffic. Now it is the exception to meet one that isn't."

## E-M-F and Flanders Owners to Tour

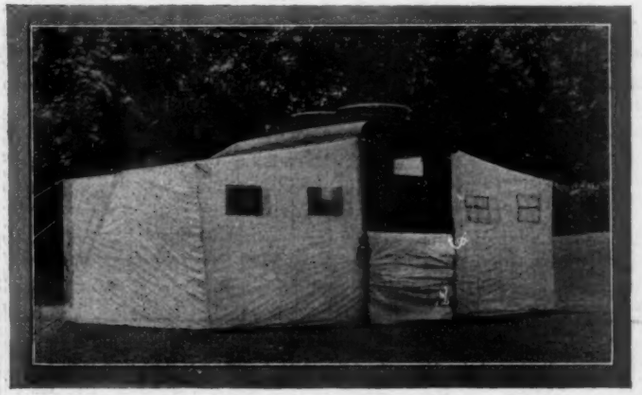
INDIANAPOLIS, Aug. 28—Frank B. Willis, manager of the Studebaker Brothers Company, of Indianapolis, is completing arrangements for a sociability tour of E-M-F and Flanders owners. This run will be from Indianapolis to Chicago, and return, Sept. 3, 4 and 5, and will start from the former city at 6 a. m., Sept. 3. Thus far there have been forty entries of E-M-F and Flanders owners from Indianapolis and vicinity.

## Rubber Company Enters Tire Field

AKRON, O., Aug. 28—The Miller Rubber Co., which recently added tires to the list of its products, has purchased five and a half acres of additional land near the factory in South Akron, for the purpose of making extensions. Previous to entering the pneumatic tire field, the Miller Rubber Co. confined its activities solely to rubber sundries.

the body on each side, affording packing space for supplies. The top is permanent, with a slat rack on the under side holding four vulcanized fibre provision boxes which are strapped into place over the rack. There is also a rack in the top for taking care of drawings, plans, etc., and arranged on the top of the body above this is a slat rack with an iron railing of sufficient size to carry four extra tires, which are tightly strapped to the rack.

Col. duPont's gift to the State of Delaware is a highway 103 miles long, from 100 feet to 200 feet wide, running from one end of the State of Delaware to the other. In building this road he is personally determined to see that it is built right, and he is going to superintend the construction of it himself. It will cost $1,500,000.



Rear view of the duPont camping outfit built into and around a Stoddard-Dayton car

## Six Perfect in Lake Tahoe Run

SAN FRANCISCO, CAL., Aug. 29.—Six cars out of fifteen finished with perfect scores to-day in second annual endurance run from this city to Lake Tahoe and return. The distance is 520 miles, a goodly part of which is through the Sierra Nevadas, rising 7,000 feet, with many very steep grades, and badly twisted roads. The cars that survived the ordeal were: American 50, Buick 26, Buick 30, Flanders 20, Franklin 18, runabout, and Winton Six.

The run proved to be unusually severe upon tires owing to heat of the valleys and severe grades over rough mountain roads. Many of the cars suffered a large number of punctures and running time was so fast that they had to use a good deal of speed to keep up with schedule.

Last year contestants complained that schedule was too slow but this year there was no complaint on this score. The schedule averaged more than 20 miles an hour on the level and over 15 miles through mountains.

## Firestone Moves into New Factory

AKRON, O., Aug. 28—The Firestone Tire and Rubber Co. is removing from its old to the new factory in South Akron. The Firestone Co., compelled some time ago to find more room, decided to build an entirely new factory instead of adding to its old one. About half the removal has been accomplished.

The old plant will be devoted to the manufacture of rims. One of the unique features of the new office arrangement is a complete restaurant, smoking room and dining room for office employees, with accommodations for 400 persons and what is considered the largest refrigerator capacity in the city. The management has also a plan, not yet formally announced, for supplying hot soup and other substantials to employees of the factory.

# Harking Back a Decade

THE *Automobile Blue Book* first made its appearance ten years ago this week. It was a sort of compendium or compilation of all sorts of information likely to be of use to automobilists and its present mission as a road guide was only promised in a limited degree.

As an indication of the great strides the automobile was making at the time it was noted that the manufacture of the electric automobile and the steam automobile made by the American Bicycle Company had been transferred respectively to the Waverley factory at Indianapolis and to the Toledo factory at Toledo, Ohio.

Henri Fournier and "Tod" Sloan arrived in New York to establish an American agency for the Mors.

A note from Homburg stated that King Edward VII had two automobiles with him. One of these was equipped with a plate of glass at the back to keep off the dust.

The Daimler company was said to be busy experimenting with a car to be driven partially by benzine and partly by electricity.

A British correspondent of *The Motor Review* advises automobilists to avoid the use of goggles. His reasoning is as follows: The wearing of goggles presupposes speed and in the eyes of the police raises the presumption of illegal speed. Therefore, in order to avoid even the appearance of evil go as fast as you like but leave off the goggles.

For the first time an automobile was named as co-respondent in a divorce case. A resident of Passaic, N. J., filed a complaint upon which the onus of "breaking up the happiest home in the world" was laid at the door of a Newark man's car.

The 500-mile endurance run to Buffalo, scheduled for September 9-14, 1901, had seventy-six entries on August 31.

Announcement was made that the Chicago Automobile Club, an embryonic organization, had decided to build a clubhouse.

The *Auto Era*, house organ of the Winton Motor Carriage Company and pioneer in that field, made its début.

# NEWS OF THE WEEK CONDENSED

AMERICUS, GA.—Right in the heart of the so-called dull season, a special train of nine cars loaded with Maxwell automobiles is on its way from the factory to this place consigned to the Americus Automobile Company. The cars are all equipped with the special 60-inch tread which is required for operation on Southern roads. The extra four inches of width is always included in Maxwell cars destined for the Southern market.

PLAINFIELD, N. J.—The Spicer Manufacturing Company has announced the installation of an electric vehicle charging station and service department.

BOSTON, MASS.—The Stutz car is now represented in Boston, an agency for it having been opened last week by the Empire Motor Car Company as an addition to its line.

INDIANAPOLIS, IND.—The Indiana Four States Tour was such a success that the automobile builders of this State have organized a State society. This took place recently at a picnic to celebrate the 1,500 miles trade boosters' tour.

BOSTON, MASS.—George Parker, who for a long time was identified with J. H. MacAlman, selling Columbia and Stearns cars in the Hub, has gone over to the commercial field and he is now sales manager of the Mack Motor Truck Company in this city.

LANSING, MICH.—Since the first of the year Secretary of State Martindale has collected automobile license fees amounting to $93,000, which is an increase of $20,000 over last year. The number plates for next year will be black numerals on an orange background.

PORTLAND, ORE.—Preparations for a dash into the Arctic zone are being made upon the Abbott-Detroit "Bull-Dog" which is now in this city. The car will be fitted with hickory runners on the front wheels and metal studded tires on the driving wheels. The car has done about 32,000 miles so far.

RACINE, WIS.—The automobile department of the J. I. Case Threshing Machine Co., Racine, Wis., is making exhaustive tests of a new type of rear axle which is being manufactured by the Green Engineering Co., of Racine, owner of the patent rights. If found entirely satisfactory the axle will be incorporated in all 1912 Case cars, it is stated.

LANSING, MICH.—T. Earle Jarrard, who for the last five years has been connected with the Reo Motor Car Company and the R. M. Owen Company, will leave the city in a short time to accept a position with the Apperson Brothers Automobile Company, of Kokomo, Ind. Mr. Jarrard will be assistant to Elmer Apperson, who is president and general manager of the concern.

AKRON, O.—H. J. Woodard, for some time manager of the New York store of the Diamond Rubber Co., has resigned and taken a position as sales manager with the Century Tire Co., of New York. He is succeeded in the Diamond branch by N. E. Oliver, who has been manager for Buffalo, and who will still oversee the activities at Buffalo in addition to his New York responsibility. A. J. Henry, of Akron, will assist Mr. Oliver in the conduct of the Buffalo branch.

BOSTON, MASS.—Manager C. P. Rockwell of the Boston branch announced, following his visit to the conference at the Rambler factory last week of the branch managers, that arrangements had been completed to erect a new home for the Hub branch on Commonwealth avenue in the near future. The Boston branch now has one of the finest salesrooms in Boston, but the officials of the Thomas B. Jeffrey Company want to have the repair department and salesrooms in the one building.

FINDLAY, O.—The Norwalk Motor Car Company, Norwalk, Ohio, has been adjudged a bankrupt in the United States court at Toledo, Judge Killets sitting. A. J. Schur, of Cleveland, an attorney, has been appointed receiver with bond at $20,000. The plant will be operated by the receiver. The proceedings were brought by the Diamond Rubber Company, of New York; the Pennsylvania Rubber and Supply Company, of Cleveland, and the Cross-Gilcrist Advertising Co., of Cleveland.

LANSING, MICH.—The Olds Motor Works is about to spend $215,000 for the erection of a modern factory building replete with fine equipment. Upon its completion 500 men will be added to the present force, making the total number of employees about 1,800. The W. E. Wood Construction Company, of Detroit, has been given the contract. The structure will be built of brick with reinforced concrete foundations and steel sash throughout. It is expected the structure will be finished in four months.

LOUISVILLE, KY.—Paducah motorists are in hearty accord for the establishment of a model highway from Louisville to Paducah, as suggested by Rush C. Watkins, president of the Louisville Automobile Club. The Paducah automobile owners have reorganized their association and will assist in securing improved roads in Western Kentucky. It has been proposed to improve the road from Paducah to Hopkinsville, where the Jefferson Davis Way can be tapped. The road from Louisville to Paducah is at present seldom used because of the poor condition of the highway.

CINCINNATI—Great interest attended the appearance of the new automobile fire engine, just completed for the city, by the Ahrens-Fox Co. For the test it was loaded with fourteen men, and ballast equal to its complement of hose.

CINCINNATI—President Pratt of the Ohio Motor Co. left yesterday on a trip to Canada via Cleveland, Buffalo and Toronto and will be absent about two weeks. He has named The Federal Motor Car Co. as representative of the Ohio company for Pittsburgh and Western Pennsylvania.

COLUMBUS, O.—The contract for supplying 40,000 or more sets of number plates to the Ohio State Automobile Department for the year 1912 has been awarded to the Scioto Sign Company, of Kenton, O., at 23 1-2 cents per set. The 1912 tags will be in green on a white background of enamel. The tags are to be numbered consecutively and the first delivery is to be made November 1. The tags are to contain the word "Ohio" and the figures 1912.

LOS ANGELES—Southern California has a telephone service that is unique, being a system of roadside stations for the use of automobile drivers in case of emergency. For instance, in case of a breakdown, it will not be necessary to walk for miles to the nearest telephone toll station, as the new system provides a portable telephone outfit for the car of each member. All that is required is to "plug in" at one of the numerous telephone poles which have been converted into emergency stations, and 'phone to the nearest garage.

AKRON, O.—The Goodyear Tire & Rubber Co. is preparing to have a storage lake, or pond, in East Akron, as a source of water supply when other sources are interfered with, so that water famines or the stoppage of regular sources of supply may not at any time necessitate the closing of their factory. Recently the company purchased eighteen acres of ground in the vicinity of Kelly avenue, and a dam is being built across the lower end of the property, so that about six feet of water will be backed up as far as the line of the property the company has acquired.

# Automobile Incorporations

### AUTOMOBILES AND PARTS

ATLANTIC CITY, N. J.—Atlantic Perfected Motor Co.; capital, $300,000; to manufacture automobiles and engines. Incorporators: Frank Brown, Thos. Kilcourse, Samuel S. Phoebus, John S. Ingram.

AUGUSTA, ME.—Autocart Co., capital, $15,000; to make automobiles and trucks. Incorporators: Chas. H. O'Brien, Lewis A. Burleigh.

BROOKLYN, N. Y.—Mohr Auto Co.; capital, $25,000; to manufacture automobiles and parts. Incorporators: Henry Mohr, Max Keve, Charles Goldstein.

CHICAGO, ILL.—Automobile Construction Co.; capital, $27,000; to manufacture automobiles. Incorporators: Albert T. Graham, H. M. Wells, Wm. E. Fuller, Geo. F. Mulligan.

CHICAGO, ILL.—Simplex Auto-Cranker Co.; capital, $100,000; to manufacture automobiles, supplies and machinery. Incorporators: Edwin A. Gardner, Ignatius F. Halton, Willard Patrick, P. W. Rosenstone.

CINCINNATI, OHIO.—Rambler Motor Car Co. of Cincinnati; capital, $25,000; to deal in automobiles and supplies. Incorporators: Geo. H. Jung, F. D. Ratterman, Charles Reed, W. H. Kaufman, Walter C. Reed.

HOPKINSVILLE, KY.—Caye-Jones Motor Co., capital, $10,000; to make automobiles.

JERSEY CITY, N. J.—Studebaker Corp. of America; capital, $100,000; to manufacture automobiles. Incorporators: M. Gregg Latimer, John B. Marsh, John R. Turner.

LOUISVILLE, KY.—Wilder Motor Car Co.; capital, $5,000; to sell, repair and rent automobiles.

NEW YORK, N. Y.—Bergdoll Motor Car Co.; to manufacture automobiles; capital, $10,000.

PONTIAC, MICH.—General Motors Co.; to manufacture electric trucks.

RICHMOND, VA.—Virginian Sales Co.; to sell Virginian automobiles. Incorporators: Louis Hartig, Louis Hartig, Jr.

TOLEDO, OHIO.—Toledo Annealing Charging Truck Co.; capital, $10,000; to make motor trucks. Incorporators: John G. Blum, M. G. Blum, Joseph M. Rutherford, Edward F. Abbey, Racheal E. Rutherford.

### AUTOMOBILE GARAGES, ACCESSORIES, ETC.

CAMDEN, N. J.—American Tire Protector Co.; capital, $1,000,000; to manufacture tire protectors and punctureproof tires. Incorporators: Robert B. Watson, John P. Donahue, Robert St. John.

DETROIT, MICH.—Climax Motor Parts Co.; capital, $50,000; to manufacture accessories.

HOBOKEN, N. J.—Imperial Garage Co.; capital, $10,000.

JERSEY CITY, N. J.—The Marquette Co.; capital, $10,000; to manufacture motors. Incorporators: S. B. Mantz, H. A. Black, John R. Turner.

MILWAUKEE, WIS.—Motor Convenience Co.; capital, $30,000; to manufacture various accessories. Incorporators: Charles F. P. Pullen, George D. Londerbeck, I. W. Davis.

NEW YORK, N. Y.—Consolidated Lubricants Co.; capital, $25,000; to make and deal in lubricating oils, greases, etc. Incorporators: Arthur R. Pardington, Warren L. Sawyer, Jos. N. Patch.

NEW YORK, N. Y.—United Rubber Co.; capital, $100,000; to manufacture rubber goods. Incorporators: Ada A. Sands, Eva C. Baker, Frank B. Vermilya.

NEW YORK, N. Y.—Automatic Fender Co. of America; capital, $1,000,000; to manufacture automobile fenders. Incorporators: Wm. M. McGuirk, Saul S. Myers, Wm. E. Lowther.

SCHENECTADY, N. Y.—Union Lubricating Co.; capital, $25,000; to manufacture and deal in lubricating oils. Incorporators: J. W. Nagle, Edward H. Robinson, M. C. Cahill.

SHAWANO, WIS.—Frogner Auto Co.; capital, $5,000; to conduct a general garage business. Incorporators: A. G. Frogner, C. E. Dunn, E. M. Williams.

COLUMBUS, O.—The Ohio State Highway Department at Columbus, O., with the assistance of the Ohio Good Roads Federation gave a roads exhibition at the Ohio State Fair during the week of August 28 to September 1. The highway department at Washington, D. C., sent displays and models relating to the subject of good roads construction and the exhibits were complete in every respect.

## A New Ball-Bearing

Joseph Schaeffers, one of the early members of the S. A. E., has returned from his European trip, bringing with him the sole U. S. agency of one of the well-known German ball bearings, the H. C. B. bearing, made by the H. Hollmann Company, in Burgsolms, Lahn.

The bearings have a solid, patented, two-part, wire-stitched cage, as shown in Fig. 2, or a sheet-steel retainer, or one consisting of two pieces only and protected by patents, as shown in Fig. 3. Among the particular features of these bearings two types for combined radial and thrust load may be mentioned. Fig. 4 shows a cross-section. These types have an angularity of contact between balls and raceways, this angularity being 30 degrees in the one, and 45 degrees in the other type, and these types are particularly well adopted for taking the combined loads of bevel gear shafts.

For all places where warping or sagging is liable to bring the shaft and the housing of the ball bearing out of alignment, a new and patented type of bearing has been placed upon the market. Fig. 1 shows a cross-section. The H. C. B. bearings are made of the finest German chrome tool steel from the Becker Steel Works, and are hardened and inspected, ground and inspected, assembled and inspected with care and thoroughness.

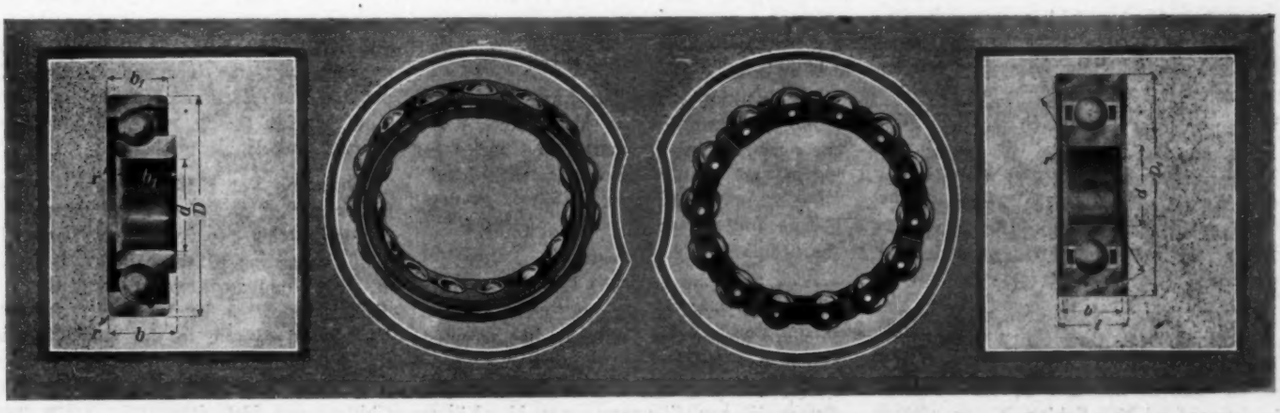


Fig. 1—Cross-section of anti-disalignment H. C. B. bearing. Fig. 2—Wire-stitched cage type of ball bearing. Fig. 3—Two-piece steel-cage bearing. Fig. 4—Cross-section of ball bearing for radial and thrust loads combined

Stearns 5-ton truck purchased by the House of Correction, Chicago, for the transportation of prisoners

BOSTON, MASS.—William Blanchard has been appointed sales manager of the Lenox Motor Car Company here, having succeeded Frank V. Cooke.

WASHINGTON, D. C.—The Commercial Automobile & Supply Co. has taken the Flanders electric agency and will handle it in connection with the E-M-F and Flanders.

PHILADELPHIA—"The Tire Shop" has removed from 1326 Vine street to larger and more suitable quarters at 225 North Broad street, in the heart of Automobile Row. David Scannell is the proprietor.

ZANESVILLE, O.—Edward B. Raemer, formerly advertising manager for the Flash Manufacturing Company, is now engaged as manager of the Valley Motor Company, of this city, handling the Overland line of cars.

ROCHESTER, N. Y.—The Selden Motor Vehicle Company announces the appointment of James Joyce as manager of sales and that of Fred A. Law as head of its engineering and production departments.

WASHINGTON, D. C.—The Carpenter Automobile Co. has sold its garage at Seventeenth and U streets, N. W., to Francis P. Blair, who will take possession on September 1. Extensive improvements will be made.

CHICOPEE FALLS, MASS.—W. Bonsor, late of the Packard Motor Car Company, is now associated with the Stevens-Duryea Company in the production department of the factory in the capacity of supervisor of parts.

ROCHESTER, N. Y.—F. M. Hoblitt, general manager of the Rector Engineering Company, of New York, will devote part of his time as manager of the wholesale department of the Selden Motor Vehicle Company.

BARABOO, WIS.—The Gollmar Garage is erecting a fine new garage building to include a large repair shop. It will cost about $8,000 and will be one of the most modern garages in the smaller cities of Wisconsin

BOSTON, MASS.—Willard M. Jenkins, who has handled the Mitchell line in the Hub ever since it was introduced there, has added the Abbott-Detroit to his line, and may probably also take on the Krit.

ITHACA, N. Y.—The J. B. Lang Engine and Garage Company has completed a fireproof garage 75 by 200 feet in which no pillars are used. Separate stalls that can be securely locked are provided for the storage of customers' cars.

CHICAGO—In addition to offices just opened at Minneapolis, Kansas City and Indianapolis, the Stewart & Clark Manufacturing Company is opening a new office at Cleveland, Ohio, at 1849 Euclid avenue, in charge of H. A. Ungar.

BOSTON, MASS.—The Abbott Motor Company, of Detroit, Mich., has just consummated a large contract with the W. M. Jenkins & Company, 288 Columbus avenue, Boston, Mass., as distributors for New England for the Abbott-Detroit line.

MILWAUKEE, WIS.—The Lion 40 has secured representation in Milwaukee, Wis., the agency being in charge of Charles E. Gavin and John G. Koerner, with headquarters in the Majestic building. A new garage and salesroom is being erected for the firm.

DETROIT, MICH.—Robert C. Winlow, formerly assistant purchasing agent of the Packard Motor Car Company, has accepted and is now occupying the position of general purchasing agent of the Grabowsky Power Wagon Company, 1735 Mt. Elliott Avenue, Detroit, Mich.

HILLSBORO, O.—R. D. Currie has recently opened a garage and repair shop at the intersection of West and Walnut streets, Hillsboro, O. The establishment contains 11,392 square feet of floor space and is one of the largest in Hillsboro.

BALTIMORE, MD.—H. S. Block, formerly connected with Waterman Brothers' Company, of California, has accepted the position as manager of the local branch of the Stoddard-Dayton Automobile Company. Leo H. Shaab, formerly manager, will be associated with the sales end of the local business.

PONTIAC, MICH.—R. McCracken, who has for some time been in Pontiac, reorganizing the office, factory and accounting system of the General Motors plants, and at the same time acting as comptroller, will leave shortly for Detroit, where he will take an important position in the office of the General Motors Company.

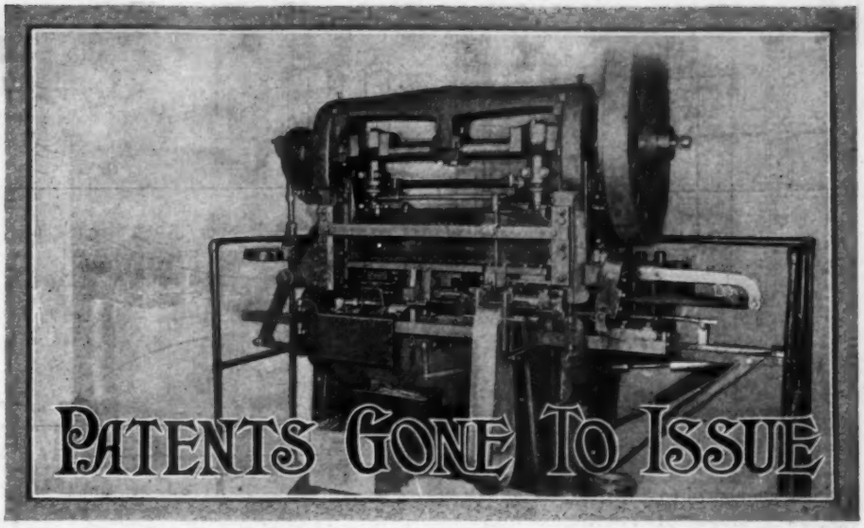
LANSING, MICH.—Arrangements have just been consummated whereby the General Motors Company will acquire ownership in a company manufacturing electric trucks. An entirely new manufacturing organization will be built up with John M. Lansden, formerly president of the Lansden Company, of Newark, N. J.

FLINT, MICH.—Before the close of the month it is expected the new plant of the Mason Motor Company will be in operation, according to Arthur Mason, general manager of the concern. Though the company has been organized only about three weeks, half of the machinery to be used in the manufacture of engines has been installed.

MILWAUKEE, WIS.—The Bates-Odenbrett Auto Co., 503-507 Broadway, has been appointed State distributor for the White pleasure and commercial cars and the Abbott-Detroit line. The Overland line has been discontinued and will be represented by the Motor Car Sales Co., 136 Oneida street, Milwaukee, which will also represent the Marion.

WASHINGTON, D. C.—The Marion Motor Car Company has leased the salesroom at 1333 Fourteenth street, N. W., now occupied by the Wilson Co., agents for the Cole and Krit. The latter will have temporary quarters with the Terminal Taxicab Co., pending the selection of a new salesroom. The Marion company will handle the Marion and American.

DETROIT.—The Emil Grossman Company has removed its Red Head spark plug factory to this city from New York. The plant, consisting of three floors, is located at 844 Woodward avenue, and the local display room has been removed from 874 Woodward avenue to the above location. As announced the Emil Grossman Company will fill orders from its New York, Chicago and Detroit quarters on an equal basis.




SPRING TIRE—A combination of two rims with a series of springs placed between them.

4. This spring tire (Fig. 1) is composed of two rims, the space between which is enclosed by means of plates arranged oppositely. Between the rims S-shaped springs are located; also stops carried on rings which are mounted on the plates mentioned. The stops permit a movement into the rings and out of engagement with the springs, arms being provided which project from the rings through the side plates located in the space between the two rims and which are movable to effect circumferential movement of the rings and the stops carried by them.

No. 1,000,796—To Jacob Whitfield Graham, Raritan, N. J. Granted August 15, 1911; filed November 8, 1910.

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FENDER—Being a new form of bumpers to be used on automobiles.

4. The patent covers the securing to an automobile of a number of brackets by means of pivots, means for holding the brackets in their adjusted positions, clamping members adjustably secured to the brackets and springs secured intermediate their ends to the brackets and at their (the springs') ends movably secured to a buffer bar, with resilient cushioning members disposed intermediate of the clamping members and buffer bar.

No. 1,000,668—To Edwin K. Conover, Paterson, N. J. Granted August 15, 1911; filed June 16, 1910.

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INTERNAL COMBUSTION GAS TURBINE—Combining the rotary and reciprocating principle.

1. This patent relates to an engine comprising a rotor with radially disposed, open-ended spiral passages, a driving shaft being rigidly fixed to the rotor and an elongated cylinder within the rotor, extending in line with the drive shaft. The cylinder has a series of passages arranged in line with those of the rotor and a piston rod is slidably mounted on the cylinder, a plurality of piston heads being mounted separately on the piston rod. An inlet port with a valve to control it is provided in the cylinder, and the inlet end of the cylinder and the space between the piston heads are connected by means of a valve-controlled passage. A spark plug is so situated as to be able to ignite an explosive mixture in the space between the piston heads, in timed relation with the piston rod movements. The piston rod and driving shaft are connected through a mechanism which serves to reciprocate the piston rod in timed relation with the rotation of the shaft.

No. 1,000,882—To Edwin Atwell, Baltimore, Md. Granted August 15, 1911; filed August 4, 1910.

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ODOMETER—A mile meter of the type which is directly connected to the hub.

2. The register which is shown in Fig. 3 is supported by the hub and a shaft, an eccentric being mounted eccentrically in the wheel hub, where is also mounted a ratchet wheel with which a bevel gear is concentrically mounted. An eccentric link is mounted in the hub and connected to a pawl carrier, having a pawl and being mounted concentrically with the ratchet wheel. The bevel gear above mentioned meshes with another bevel gear connected to the register, a gear on the register shaft engaging loosely with the bevel gear and another gear secured to the end of the axle.

No. 1,000,861—To Curtis Hussey Veeder, Hartford, Conn., assignor to the Veeder Manufacturing Company. Granted August 15, 1911; filed January 12, 1911.

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SPANNER-WRENCH—This is descriptive of a wrench with one jaw having a convexly curved face and the other fitted for various sizes of nuts.

5. By this patent is covered a wrench for nuts of different sizes. The spanner end has a convexly curved jaw apt to engage a nut facet, the other jaw having several plane grip faces each capable of engaging a certain size of nut upon a facet diametrically opposite to the nut facet engaged by the curved jaw. Each of the grip faces of the second jaw is parallel to the tangent of the first (curved) jaw at the point of engagement, thereby permitting of securely gripping the nut. The wrench jaws are so proportioned that the spanner may rotate in one direction.

No. 999,968—to Edwin A. Denham, assignor to the Erie Wrench Co., of New York, N. Y.; granted August 8, 1911; filed September 10, 1910.

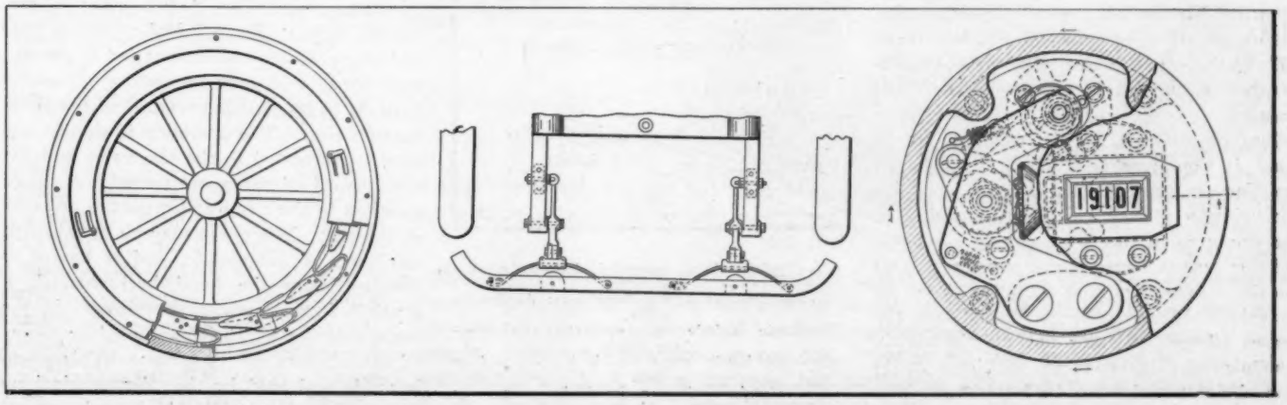



Fig. 1—Illustrating the spring-tire patented by J. W. Graham

Fig. 2—Showing the new Conover automobile safety fender

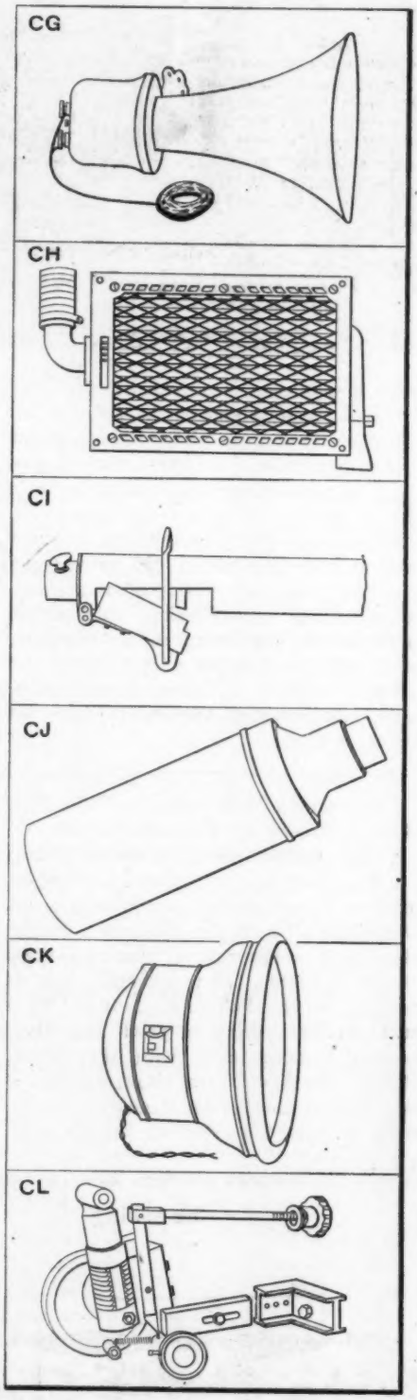
Fig. 3—Mechanism of the latest type of Veeder odometer

# Seen in the Show Window

STRENGTH of sound is the chief claim made for the Typhoon electric horn, which is illustrated at CG. The type shown consists of a motor enclosed in the short cylindrical part of the horn and which serves to excite the sound waves in the air. The sound on its travel out of the device is considerably intensified by the horn proper or megaphone, as it might be called, which is about three times as long as the motor portion and serves to strengthen considerably the sound produced by the motor. This latter is connected to a battery, either a storage battery or a set of dry cells, and operated by pressing a button on the steering wheel or wherever the automobilist finds it convenient to install it. The interior members of the horn are of such material as will warrant longevity on their part, and the "megaphone" is made of strong brass, thus making for a pleasing appearance. The signal is the product of the Typhoon Signal Company, whose factory is located at 1389 Milwaukee avenue, Chicago, Ill.

COMPLAINT of car owners is not unfrequently aroused by the cold temperature obtaining in the automobile in Wintertime, and to do away with this troublesome state of things the Al-Ton car heater, shown at CH, will be a good thing to place in an automobile. This heater utilizes the waste heat of the exhaust which by the use of a by-pass valve is led through several pipes located under the metal net work shown in the illustration. After passing through the heater, the exhaust is conducted to the muffler in the usual way, and since the construction of the apparatus obstructs the flow of the gases in no way, no back pressure is caused by the use of the heater. The Al-Ton Motor Accessory Company, South and High streets, Akron, Ohio, makes this device.

HEATED gases expand in exhausting and thereby produce a noise, especially if the expansion of the gases is handicapped in any way. To reduce the noise caused by the expanding exhaust gases silencers are used, and it stands to reason that if the gases instead of through the muffler are passed through a suitable pipe or whistle a very efficacious signal may be produced in this way. At CI a whistle of this type is shown which is connected up to the exhaust lead, but normally closed by a valve. If the valve is opened and the gases allowed to enter the whistle a rich, mellow note is produced which is easily heard for a mile ahead of the car. The Eagle whistle is made by the Eagle Whistle Company, of Boston, Mass.




CG—Typhoon horn, operated electrically from the dash
CH—Al-Ton car heater used gases flowing to muffler
CI—Eagle whistle utilizing exhaust to produce signal
CJ—Vaco bottle keeps liquids hot or cold at will
CK—Columbus electric headlight comes in brass or black finish
CL—M. & L. crank-operated reciprocating tire pump

EVERYTHING which makes for comfort in touring is welcomed by automobilists, and a very useful accessory which serves this end is shown at CJ, this being the Vaco bottle, made by the Caloris Company, Philadelphia, Pa., for the purpose of keeping liquids warm or cold for a considerable length of time. The bottle which is transported in a metal container has a double wall of thick glass, the space between the two walls being hermetically sealed after the air has been exhausted from it. The practically empty space prevents heat from passing through it either into or out of the bottle, so that it is capable of keeping liquids ice cold for three days or boiling hot for twenty-four hours, if the bottle is stopped up tightly by the cork. In addition to these features, the bottle may be used to keep milk sweet for any length of time without the use of ice or any cooling substance.

LAMPS, especially headlights, are now very frequently of the electric type, owing to the great illuminating power and cleanliness of this class of lighting equipment, and the illustration CK shows a well-known standard type, this being the product of the Columbus Auto Brass Company, Columbus, Ohio. The lamp is made of brass throughout, with a reflector provided on the inside, the inner space of the lamp being closed up by a heavy glass plate. The lamp here illustrated is a headlight, and while the regularly furnished type is finished in brass, a black effect may also be secured if the purchaser so desires.

LONGEVITY of tires depends upon their being fully inflated at all times, and while the old style of hand pump is something of an inconvenience the M. & L. tire pump, seen at CL, does away with the bulk of the trouble arising from the operation of such a pump. The M. & L., which is furnished with 12 feet of high-pressure hose and all necessary connections and is guaranteed for a year, may be used to pump the tires up to 90 pounds pressure within three minutes time. The operation is simple: the hose is connected to the tire valve and the hand wheel of the pump turned. A gauge attached to the pump indicates the pressure in the tire. The pump may be attached to any type of automobile, and is bound to operate, since the handwheel through a crankshaft reciprocates the plunger in the pump cylinder which is air cooled by means of cannelations on its surface. This pump is made and sold by the Migeot Machine Company, of 333 North Fourth street, Philadelphia, Pa.